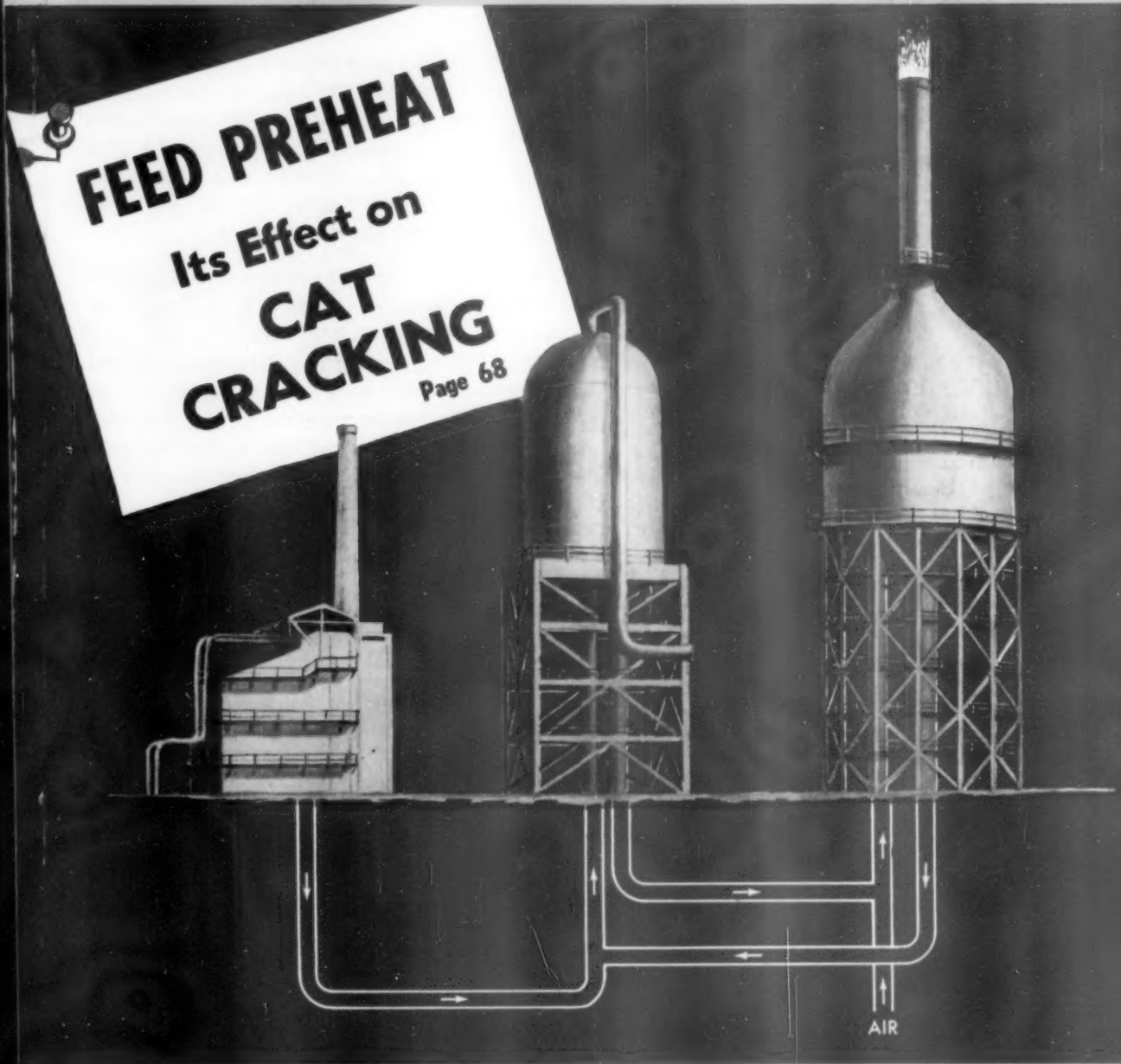
JANUARY 10, 1955

the OIL AND GAS JOURNAL

FEED PREHEAT
Its Effect on CAT CRACKING

Page 68

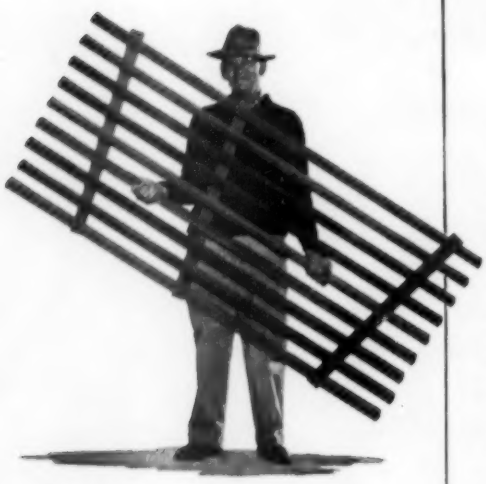


'55 OIL PROSPECTS

. . . As viewed by Journal's Editorial Advisory Board . 65

• Census Bureau Will Measure Oil's Muscles . 46

Examine the filling of a
FLUOR COOLING TOWER
and get the whole story



Fluor uses only 100% clear all heart redwood for filling

Fluor grid decks are not only sturdily built but are made from the highest grade redwood lumber—100% clear all heart redwood—the finest cut of the log. Clear all heart redwood is free from defects and sapwood and under normal controlled water conditions will give many many years of trouble-free service. We invite you to investigate our filling before making your selection of a cooling tower.

On an average, the price of a cooling tower is based 30% on the mechanical equipment and about 70% for lumber and fabrication. For example, in a Cooling Tower costing $200,000, the mechanical equipment will amount to approximately $60,000 and the tower structure about $140,000. Of this $140,000 about 30% (or $42,000) consists of the filling (grid decks) inside the tower which breaks up the water for greater exposure to air.

The filling is in reality the heart of the tower and its design and construction is of utmost importance. All Fluor Tower filling is mill cut and assembled into grid panels, 2 ft. 10" wide x 5 ft. 11½" long. Nine bars are nailed (with 6 penny copper nails) to three 1x2 cross cleats. The bars are cut on a 25% bevel from 1 x 3 boards; each bar averages 1" x 1½". Grid panels are strong enough to support three 200 lb. men and are actually used as scaffolding during tower erection and inspection. You get more years from a tower with this kind of filling.

Write for illustrated bulletin
"Cooling Water for Industry."

Grid decks easily support three 200 lb. men

Grid decks serve as scaffolding during erection

A 1x3 makes two bars for Fluor grid decks

BE SURE WITH

FLUOR

THE FLUOR CORPORATION, LTD
LOS ANGELES 22, CALIFORNIA

FLUOR OF CANADA - TORONTO
FLUOR PERUANA, S.A. - LIMA
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BOSTON
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HOUSTON
BIRMINGHAM
TULSA

the OIL AND GAS JOURNAL JANUARY 10, 1955 VOL. 53 NO. 36

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In Brief . . .

1. IMPROVED OPERATION . . . Increasing the feed preheat in catalytic cracking results in reduced coke yield, increased plant capacity, and improved liquid recovery. Commercial operations have shown that the degree of feed preheat actually serves two functions: (1) to meet heat-balance considerations for a specific type of design and process conditions; and (2) a separate function wherein catalyst circulation rate affects product distribution for an individual unit.

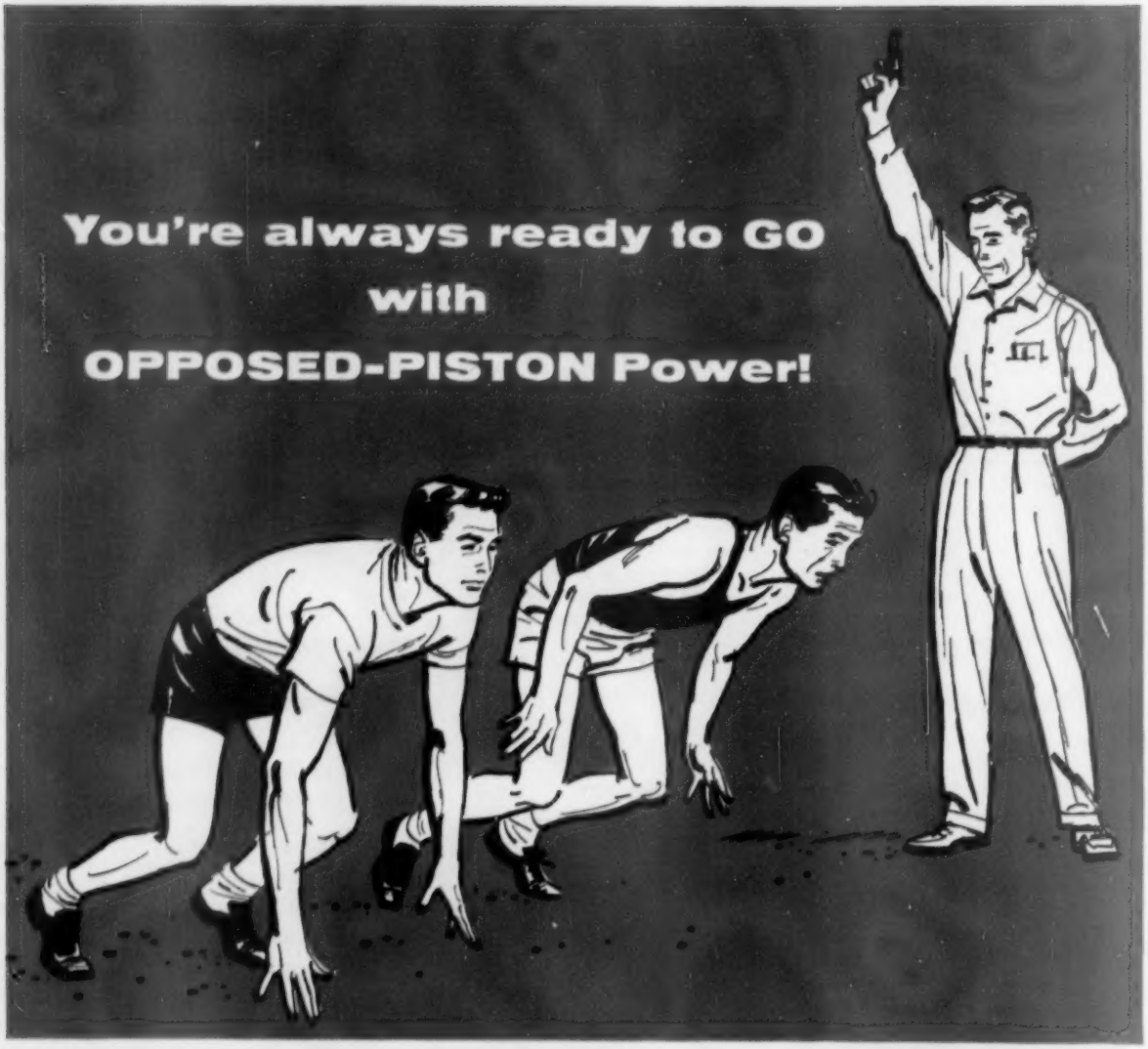
2. ACTIVE AREA . . . The Dora Roberts trend is the most active deep development in West Texas. The trend now has Ellenburger production from a string of discoveries 17 miles long. Present aggressive drilling campaign keeps 19 rigs busy developing the rich pay zone found at 13,000-15,000 ft. Drilling presents few problems and tests are completed in 100-120 days.

3. LONGEST BRIDGE . . . Texas-Illinois is spanning the Mississippi with the world's longest pipeline suspension bridge. The structure, which has a main span of 2,150 ft., is designed to support two 20-in. pipelines, 75 ft. above the highest recorded water level. Structure is expected to be completed by March and will replace three 20-in. underwater crossings.

4. RECOVERY DIVIDEND . . . Incorrect decisions about secondary-recovery programs have been made because of lack of data available for making necessary evaluations. In other instances, incorrect decisions have been made because of incomplete engineering studies regarding injection methods. In fact, most fields where secondary-recovery operations are being carried out are being found susceptible to some type of improvement. Consequently, sufficient data, research, and engineering studies are of the utmost importance in reservoir evaluation.

5. NEW SEISMO TOOL . . . The high-resolution system, a new type of exploration seismograph equipment, has recently been introduced to the petroleum industry. The system was designed to record very shallow reflections at 50 to 2,500 ft. However, useful seismic information has been obtained to a depth of 10,000 ft. The system gives a clear, picture-book type of record. It frequently succeeds in getting records where conventional systems fail.

You're always ready to GO with OPPOSED-PISTON Power!

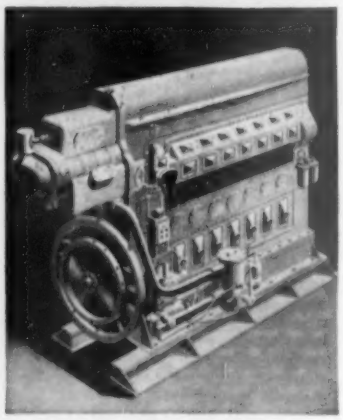


Take it either way . . . for fast starts or high availability . . . the Fairbanks-Morse Model 38F 90 diesel can't be beat for pipe line pumping. Whether you pump with diesel power 365 days of the year, or only during emergencies, no other engine can approach the dependability, maintenance economy and compactness of its Opposed-Piston design.

The Model 38F has minimum rotating masses, perfectly balanced . . . it can be brought up to full speed and placed on the line in less than 15 seconds. And 40% fewer moving parts also mean there are 40% fewer reasons for this engine to break down. Consequently, availability is higher . . . maintenance costs exceptionally low.

Compactness is another distinction of Opposed-Piston design . . . here is an engine that's 20% smaller and lighter than any other engine in its horsepower range . . . a big point to consider when pump sites are remote and building costs are high.

Other O-P advantages are three-way fuel options . . . diesel, dual fuel or spark ignited gas . . . wear-free aluminum bearings, and maximum interchangeability of parts. Call your nearby Fairbanks-Morse Diesel Oil Field Expert, or write to Fairbanks, Morse & Co., Chicago 5, Illinois.



Model 38F 90, 320 to 825 hp.

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a name worth remembering when you want the best

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL & GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

B.F.Goodrich hose more flexible, extra strong for deep drilling

HERE'S a hose that has all the strength it takes to handle extreme bottom hole pressures, yet is still the most flexible one made for heavy-duty service. It's B. F. Goodrich Highflex rotary drilling hose.

Spiral-wrapped cable wires make it resistant to bursts, qualify it for Grade C (5000 lb. test pressure) American Petroleum Institute. Hose ends are reinforced with additional plies of wire and fabric to protect against bending stress at the couplings. This extra strength means no hose blowouts—added safety for your crew and rig.

But for all its ruggedness, there's no dead weight to drag when Highflex hose is moved on or off the job. It's easy to attach to the rig, hangs well from the standpipe, and coils easily without kinking.

The thick, tough cover on Highflex resists gouges, scrapes, tears. Sun, wind and rain will not harm it. Oil in the mud will not cause swelling or rotting of tube.

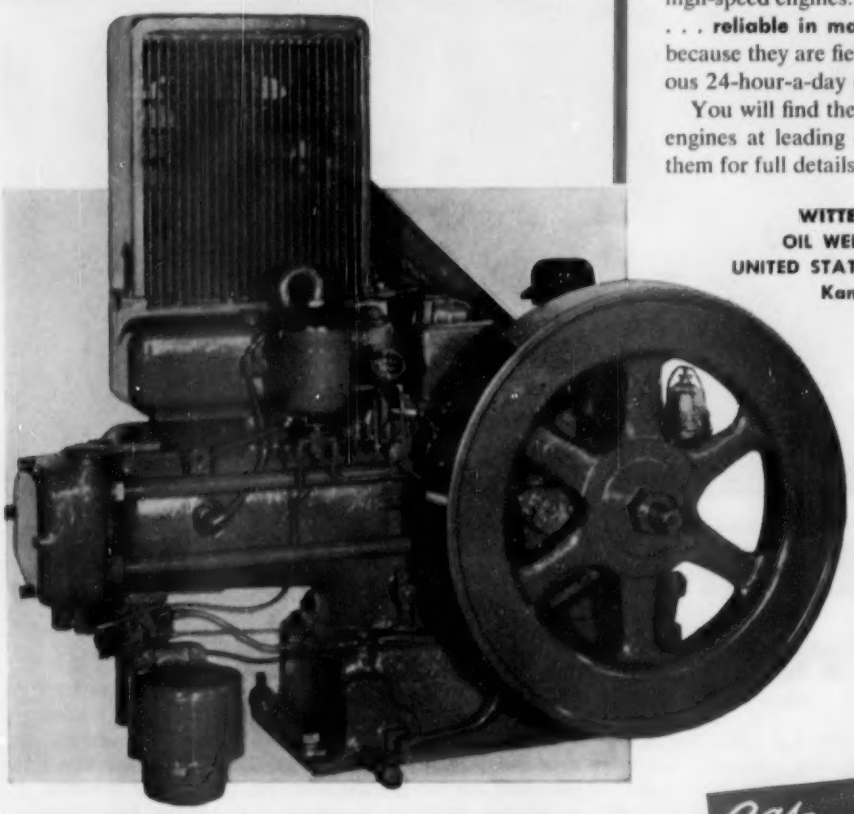
This longer-lasting hose is available at leading supply stores. And here's something to keep in mind. When emergencies make service the *first* consideration in buying hose, you can get the replacement you need any time day or night at one of these B. F. Goodrich warehouses: Los Angeles, Great Bend, New Orleans, Hobbs, Williston, Oklahoma City, Tulsa, Dallas, Houston, Odessa, Wichita Falls. *The B. F. Goodrich Company, Dept. M-358, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

Looking for economical, 24-hour-a-day pumping power?

Ask your supply store for

WITTE ENGINES!



• When natural gas fuel is available, production men think first of Witte Gas Engines for economical power . . .

. . . **economical in low maintenance costs,** because they are Witte-built single cylinder, condenser cooled engines, with a medium operating speed which assures longer service life as compared to high-speed engines.

. . . **reliable in maintaining pumping schedules,** because they are field proven and built for continuous 24-hour-a-day operation.

You will find the complete line of Witte oil field engines at leading oil field supply stores . . . ask them for full details or write for booklet No. W-21.

WITTE ENGINE WORKS
OIL WELL SUPPLY DIVISION
UNITED STATES STEEL CORPORATION
Kansas City 26, Mo.

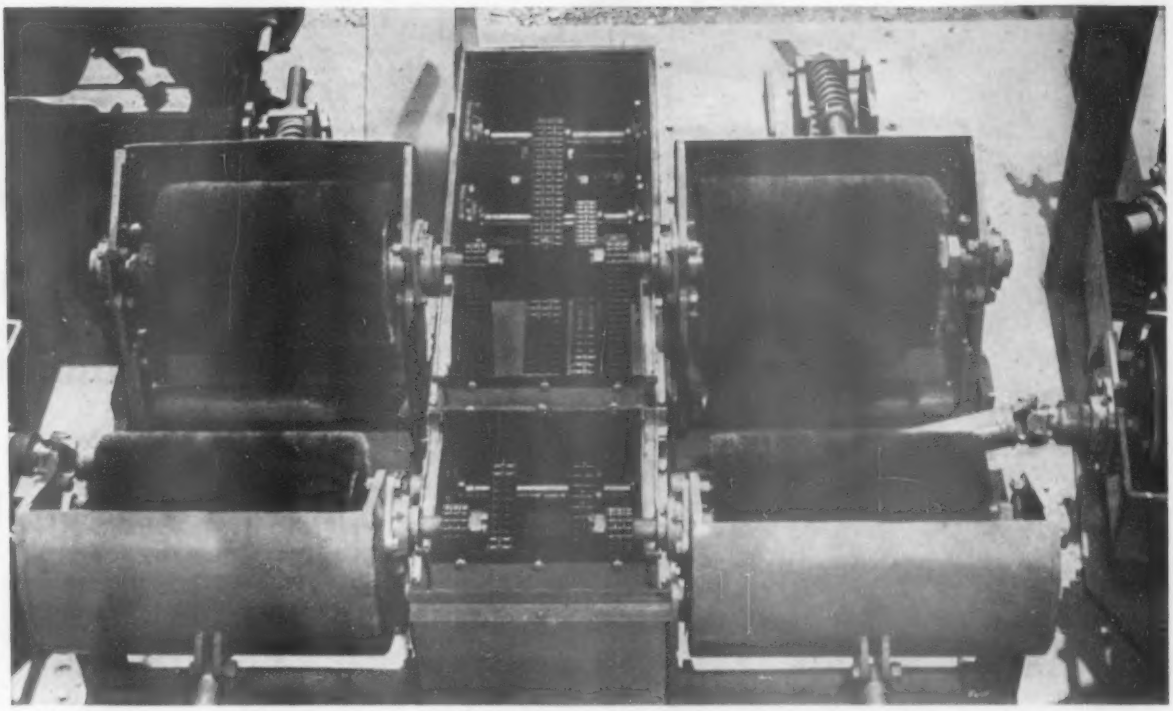
WITTE ENGINES

USS

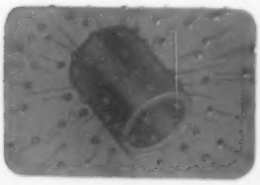
Gas-gasoline models from 5 to 15.5 hp

Full diesel models from 3.75 to 12.5 hp

UNITED STATES STEEL



Link-Belt Roller Chain drives are used throughout this pipe cleaning and priming machine, as are Link-Belt ball and roller bearings.



SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL, coupled with rigid testing, insures uniformity.

FASTER COUPLING and uncoupling of multiple-width chain with E-Z Assembly.

PRE-STRESSING of multiple width chain provides uniform load distribution.

In roller chain... EXTRAS like these give you extra reliability

LINK-BELT Precision Steel Roller Chain meets the three big requirements for greater reliability on your drilling and other demanding power transmission jobs.

(1) Long life—Added manufacturing refinements like the four shown above are your assurance that Link-Belt roller chain lasts longer.

(2) Low maintenance costs—High resistance to wear eliminates frequent adjustments.

(3) High efficiency—Positive action, independent of atmospheric conditions. No power loss through slippage or excessive bearing friction.

You can get complete information from 148-page Data Book 2457. It covers single and multiple width roller chain and sprockets in ¼" through 3" pitch, 1" through 3" double pitch. Ask your nearest Link-Belt office for a copy.

LINK-BELT

ROLLER CHAINS and SPROCKETS

13.691

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.

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...needed:

factual information on water potential to locate new factory site!

—Many facts must be gathered, screened and verified before a decision that may involve millions of dollars in capital expense is made. And not the least important is the water potential

This is one of the many services that leading industrialists have called upon Layne to perform. The man from Layne is eager to answer any questions relating to water. And agriculture, industry and municipality know that it is wise first to "ask the man from Layne."

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MEMPHIS 8, TENNESSEE

Layne Associate Companies throughout the World

water wells • vertical turbine pumps • water treatment

DARLING

VALVES

What's *SURER* valve performance worth to you?

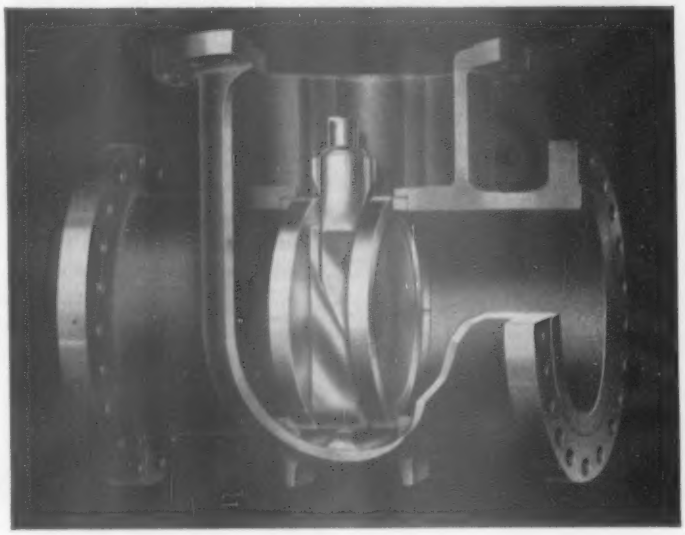
IN your service, the thing about valves that costs the most is down time. Right? And sometimes even *preventive* measures are pretty costly, too!

All right, here's a fact that Darling gate valve users everywhere will vouch for. The Darling *fully revolving double disc, parallel seat principle* means *easier* operation, *surer* closure, less chance of trouble, month in, month out. And you'll save on maintenance all along.

Why not check into Darling gate valves for your requirements? Find out *how* they assure these advantages. We'll gladly furnish general or specific details. Just say the word.

Above top: Darling 30" motor-operated gate valve powered by gas from line pressure.

Cutaway, below, shows simplicity of Darling's unique fully revolving double disc parallel seat gate valve principle—just four simple working parts—two plain interchangeable no-pocket discs and two husky wedges.

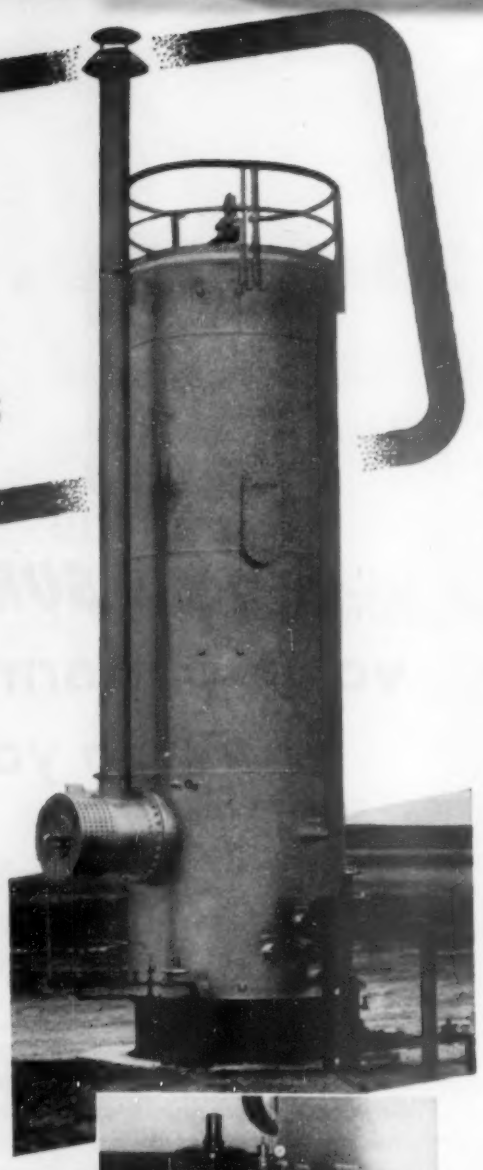


DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

• We put the piping inside, out of the cold... and solved the problem of Treater Operation in COLD Climates



PARKERSBURG
Winterized Treaters

Putting the piping inside the treater has brought about important advantages that solve the problems of treater operation in cold climates and resulted in more efficient performance in any weather.

Radiation loss is substantially reduced because inlet and discharge pipes are inside and rise to the top of the treater.

Discharge water is protected from freezing because weir box and discharge pipe are inside the treater.

All connections are grouped close to the firebox which not only simplifies hook-up, but makes it easy to house the controls for protection against cold weather.

Additional pre-heating of the incoming emulsion takes place as it travels from bottom to top of treater through a pipe in the hot water and oil.

Increased water capacity with less heat loss to the water has been achieved by a rearrangement of the fire tube.

Internal heat exchanger can be furnished to enclose the emulsion inlet and clean oil outlet piping. Outside heat exchanger and pre-heaters are also available.

• *Ask your Parkersburg Representative about the solution to emulsion treating problems in cold climates with a Parkersburg Winterized Emulsion Treater.*

• Note the grouping of connections, valves and controls near the firebox and at ground level. They are easily and economically housed for protection against weather.

5425

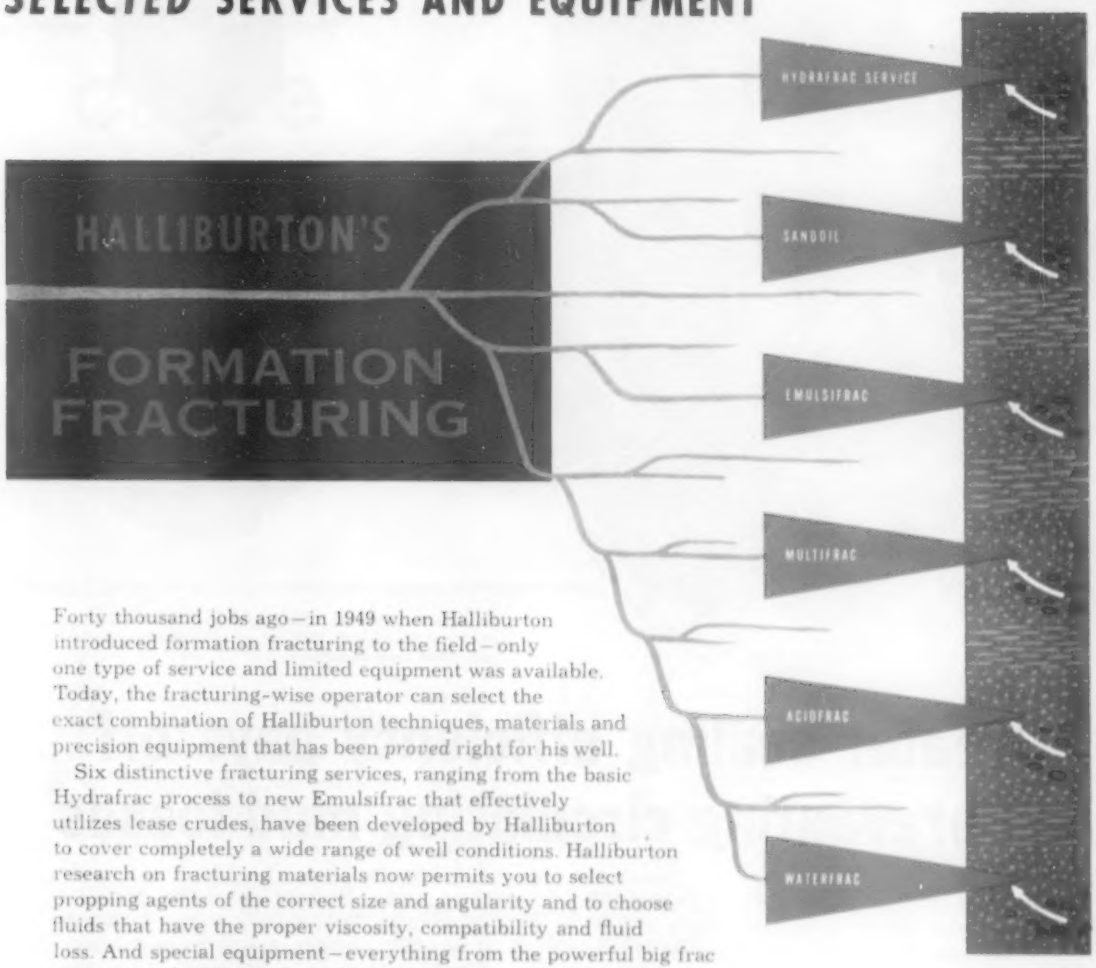
THE PARKERSBURG RIG & REEL COMPANY • PARKERSBURG, WEST VIRGINIA

Division of Parkersburg-Aetna Corporation

PRESSURE EQUIPMENT

SEPARATORS • HYRECO • DEHYDRATORS • KNOCKOUTS • SCRUBBERS • TREATERS • HEATERS

SUCCESSFUL FRACTURING STARTS WITH *SELECTED* SERVICES AND EQUIPMENT



Forty thousand jobs ago—in 1949 when Halliburton introduced formation fracturing to the field—only one type of service and limited equipment was available. Today, the fracturing-wise operator can select the exact combination of Halliburton techniques, materials and precision equipment that has been *proved* right for his well.

Six distinctive fracturing services, ranging from the basic Hydrafrac process to new Emulsifrac that effectively utilizes lease crudes, have been developed by Halliburton to cover completely a wide range of well conditions. Halliburton research on fracturing materials now permits you to select propping agents of the correct size and angularity and to choose fluids that have the proper viscosity, compatibility and fluid loss. And special equipment—everything from the powerful big frac pumpers to Halliburton's exclusive Proportioner-Blender—gives you new and better control of every job.

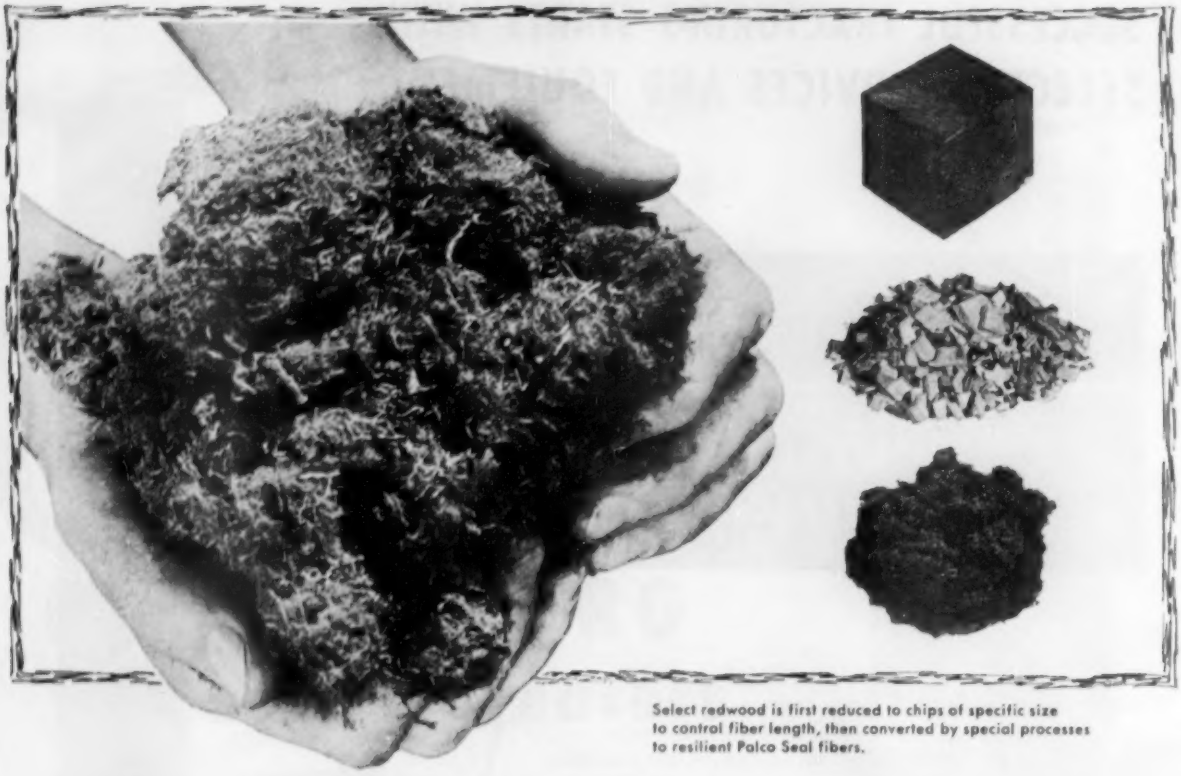
Since 1949 Halliburton field crews have been gaining the unmatched experience that, combined with the right selection of service, materials and equipment, gives the proved formula for fracturing success! 3 out of 4 wells treated have produced an average of 175% additional oil. You can get all the facts on Halliburton Formation Fracturing Services and other production boosters from the new bulletin, "Rx For Production Improvement Techniques." For your copy or for full information on how to select the successful fracturing service for your well, call your local or district office of the Halliburton Oil Well Cementing Company.

HALLIBURTON

FRACTURING SERVICES

Hydrafrac Service ... Patented by Stanolind Gas and Oil Company

211 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG



Select redwood is first reduced to chips of specific size to control fiber length, then converted by special processes to resilient Palco Seal fibers.

Greater sealing efficiency pays off in preventing circulating mud losses

The time required to establish an impregnable barrier, the amount of material used, and the permanence of caulking are important characteristics of preventive and corrective lost circulation materials. Low in price, Palco Seal has proved its economic advantages through meeting these requirements with greatest efficiency in field applications wherever thief formations and porous conditions exist.

Palco Seal's combination of long and short fibers mixes easily with mud, stays in suspension, and is carried immediately to loss areas. It quickly sets up a dense matted barrier which becomes embedded in porous strata and fissures or cracks. Because Palco Seal possesses the inherent qualities of the enduring redwoods from which it is derived, it is naturally resistant to rot or decay and offers a lasting caulkseal.

Palco Seal is a *designed* product from a basically correct raw material . . . not an adapted by-product. Selected redwood is reduced to uniformly classified chips and exploded in steam digesters to form a uniform resilient fibrous material. Palco Seal is backed by over a decade of actual field use. For the most efficient prevention of loss of circulation in drilling operations, investigate Palco Seal.

Now available in loose-filled 40-lb. bags for easy handling. Also available in 80-lb. bales.

DEVELOPED THROUGH PALCO RESEARCH

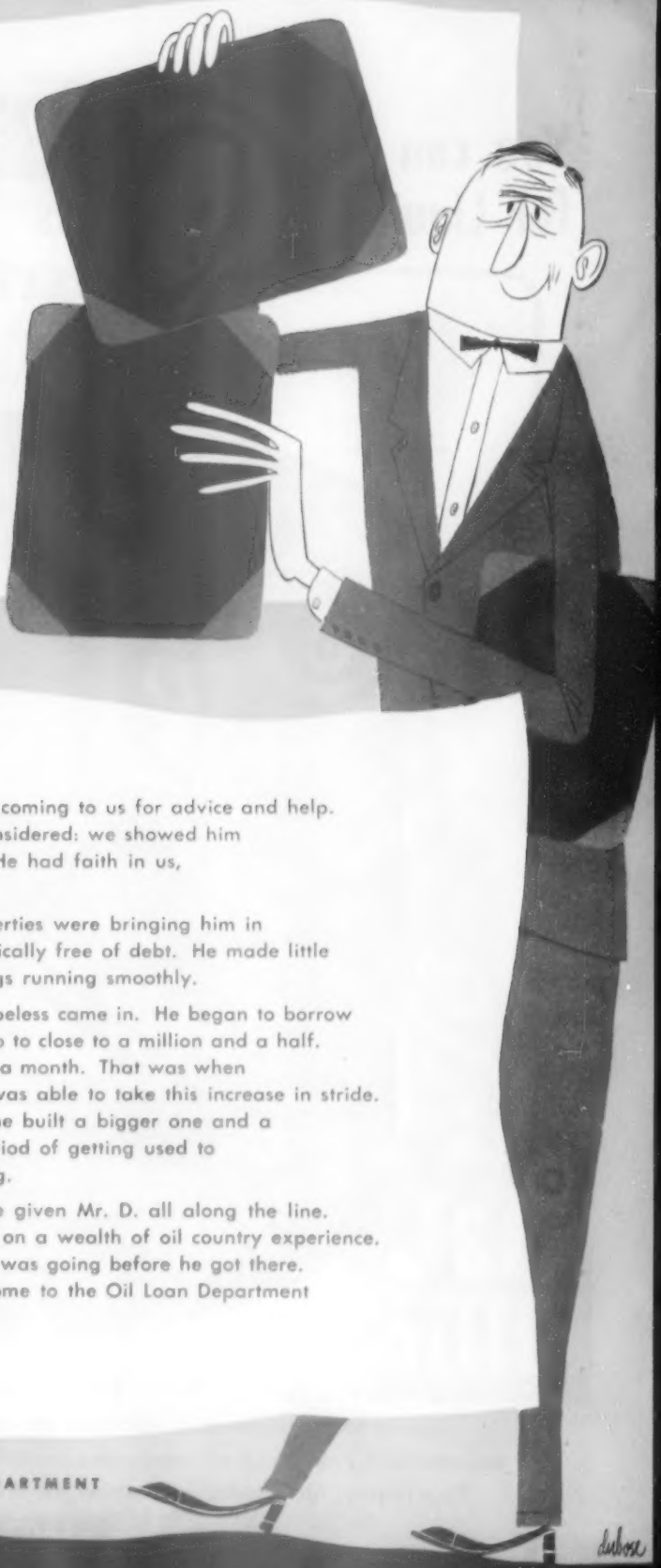
WRITE FOR BULLETIN No. 4-02 describing the properties, operating advantages, and composition of Palco Seal.

Available through oil field and mud service organizations.

THE PACIFIC LUMBER COMPANY

100 Bush Street, San Francisco 4, California
35 East Wacker Drive, Chicago 1, Illinois

Mr. "D" came for advice



When Mr. D. first got started he began coming to us for advice and help. We helped him in a way that he had not considered: we showed him the need for building a good organization. He had faith in us, and he did build a good operation.

Mr. D. was doing pretty well. His properties were bringing him in around $25,000 a month, and he was practically free of debt. He made little deals all the time, just enough to keep things running smoothly.

Then a wildcat that was considered hopeless came in. He began to borrow to define his field limits, and his debt ran up to close to a million and a half. But his income jumped to around $100,000 a month. That was when Mr. D.'s organization paid off for him. He was able to take this increase in stride. With the nucleus of a strong organization, he built a bigger one and a strong one. Instead of having a difficult period of getting used to bigger operations, he sailed smoothly along.

We are proud of the help that we have given Mr. D. all along the line. We helped him with impartial advice based on a wealth of oil country experience. We helped him because we knew where he was going before he got there. This sort of help is why oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Facilities of the Oil Loan Department of The National Bank of Commerce are available in Wyoming, Colorado, Nebraska, New Mexico, Texas, Louisiana, and Mississippi

You can depend on "Varec" Equipment for Liquid Storage Tanks

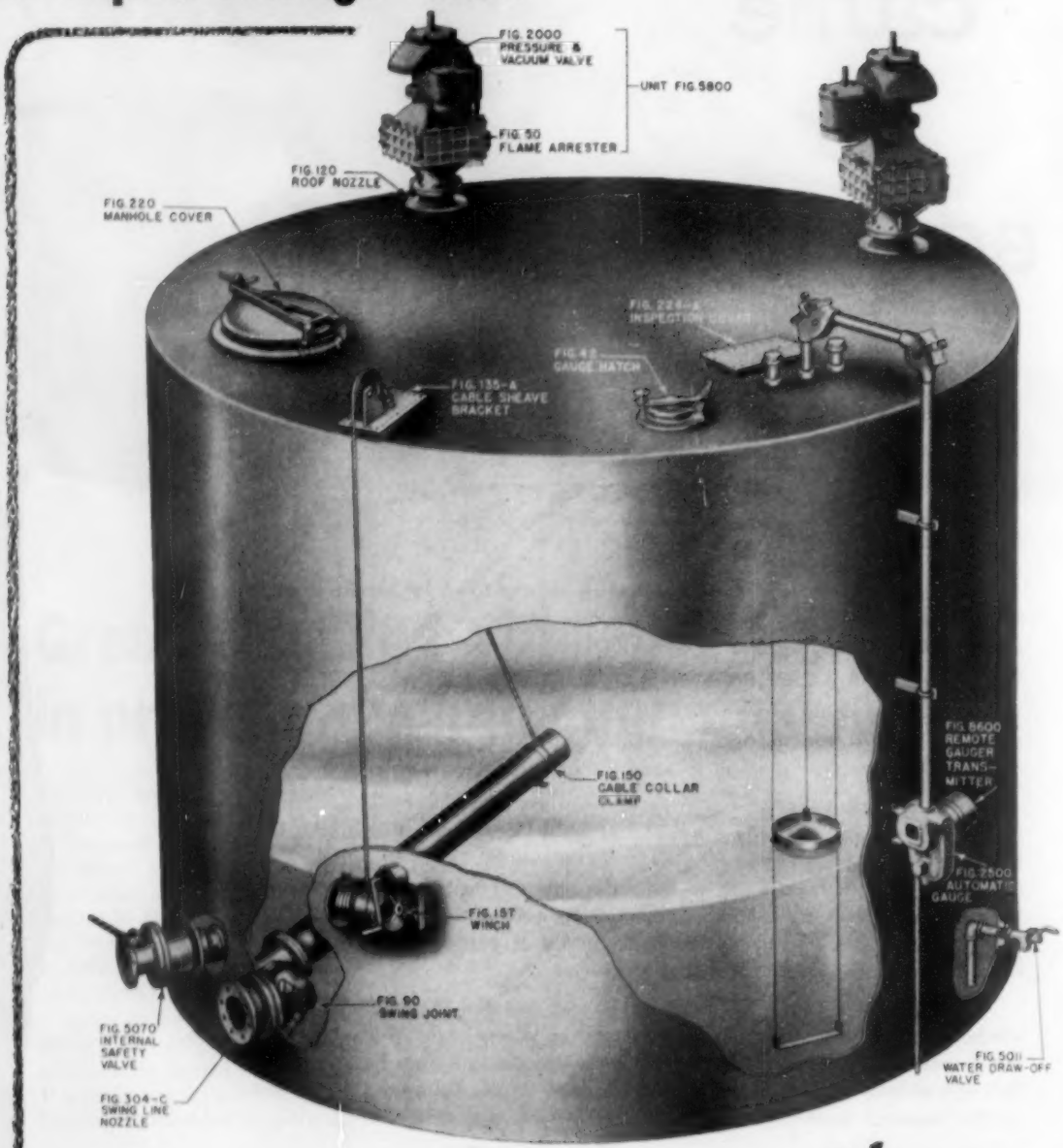


FIG. 2000 PRESSURE & VACUUM VALVE
UNIT FIG. 5800
FIG. 50 FLAME ARRESTER
FIG. 120 ROOF NOZZLE
FIG. 220 MANHOLE COVER
FIG. 224-A INSPECTION COVER
FIG. 42 GAUGE HATCH
FIG. 135-A CABLE SHEAVE BRACKET
FIG. 8600 REMOTE GAUGER TRANS-MITTER
FIG. 150 CABLE COLLAR CLAMP
FIG. 2500 AUTOMATIC GAUGE
FIG. 157 WINCH
FIG. 90 SWING JOINT
FIG. 5070 INTERNAL SAFETY VALVE
FIG. 304-C SWING LINE NOZZLE
FIG. 5011 WATER DRAW-OFF VALVE

For over a quarter of a century, "Varec" has been manufacturing quality tank equipment. Its reliability and satisfaction are attested by thousands of installations located all over the world. Your request for detailed information will bring our prompt reply.

"Varec"

961-4

VAPOR RECOVERY SYSTEMS COMPANY
2820 No. Alameda St., Compton, Calif.
CABLE ADDRESS
Varec Compton, Calif. (U.S.A.) All Codes

How much is your annual bill for drilling lines?

HOW TO STOP A LEAK

You don't buy drilling lines with petty cash. Wire rope costs the drilling industry millions annually . . . one reliable estimate is $100,000 a day!

The heavy end of this million-dollar burden is carried by rotary and cable tool men using conventional lines.

Wire rope can be less expendable. Let us tell you briefly about SpringKore and PlastiKore.

The heart of a SpringKore rotary drilling line is a tightly coiled steel spring, packed with lubricant against rust and wear.

The high-carbon cold-drawn steel spring center will flex without crushing. You get a uniform line that stays that way under very trying conditions.

With a SpringKore line you can operate with a confidence you never felt before.

PlastiKore cable tool drilling lines have a polyvinyl center that is permanently firm and flexible.

It guards against internal corrosion—absorbs no moisture.

Even acids do not affect it.

You get a uniform line with a tough, firm center that never pulls down.

Ask any J&L man for a list of drillers in your area who have stopped a major maintenance leak with SpringKore or PlastiKore.

J&L STEEL

PESA
PARTNERS IN PETROLEUM PROGRESS

"...here's MY warehouse!"

Jones & Laughlin
STEEL CORPORATION
SUPPLY DIVISION—TULSA, OKLAHOMA
Serving The United States and Canada

104-S

"I'll be home sooner than I expected!"

"In all the Republic Line Pipe we've installed so far, not a single joint has been out of round. Sure makes welding easy—and fast. At this rate, we'll shorten our construction schedule by at least two days."

It's not surprising. That's Republic *Electric Resistance Weld* Line Pipe they're installing. And they'll get high-speed welding of the entire circumference every time. Why? Because there are no delays shifting out-of-round pipe to find true fitting ends. Moreover, the high ductility of low-carbon steel makes it weld quickly, bend smoothly without severe wrinkling.

REPUBLIC

World's Widest Range of Standard

One word sums up Republic Line Pipe dependability. That's *uniformity*. Flat rolled steel of uniform thickness is formed into pipe of uniform circumference. Walls are uniform. So is yield strength.

Republic, a leading pipemaker for more than 25 years, makes 3 kinds of line pipe: Electric Fusion Weld in sizes 24″ through 30″ O.D.; Electric Resistance Weld in sizes 2⅜″ through 16″ O.D.; and Continuous Butt Weld from ⅛″ through 4″ nominal. On your next oil or gas transmission job, whether high or low pressure, call Republic. Send coupon for interesting literature.

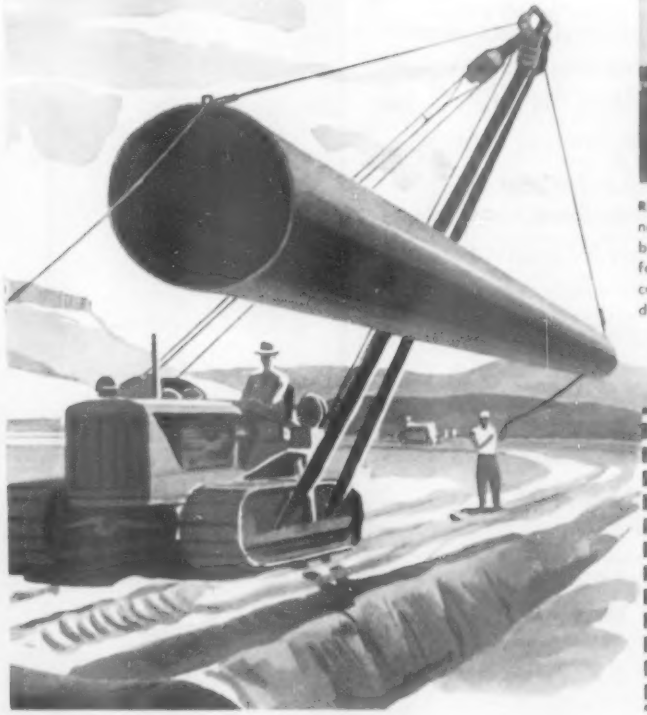
STEEL

Steels and Steel Products

REPUBLIC ALLOY STEELS resist the severe strains, wear and corrosion encountered in drilling operations. Their toughness and ductility assure maximum resistance to impact and torsional stresses. Their hardenability makes them particularly suitable to withstand surface abrasion and to prevent thread galling. Republic Metallurgists are constantly working with equipment manufacturers to improve their products through the use of alloy steels.

CASING AND TUBING by Republic include both Normalized Electric Weld in grades H-40 and J-55 and Seamless in grades J-55 and N-80. The very latest in precision equipment and techniques go into their manufacture to help assure full-time dependability. Both oil and gas operators agree Republic Casing and Tubing, widely used for over 25 years, are second to none in the industry. Sold through oil country distributors.

REPUBLIC STEEL PIPE for gathering lines, distribution and general maintenance work has been a standard in the oil and gas industry for years. Made by Republic's continuous butt weld and electric resistance weld processes, it features uniform ductility and strength; tight adherence of the galvanized coating; ease of threading, bending and welding. Call your nearest Republic distributor for immediate delivery.

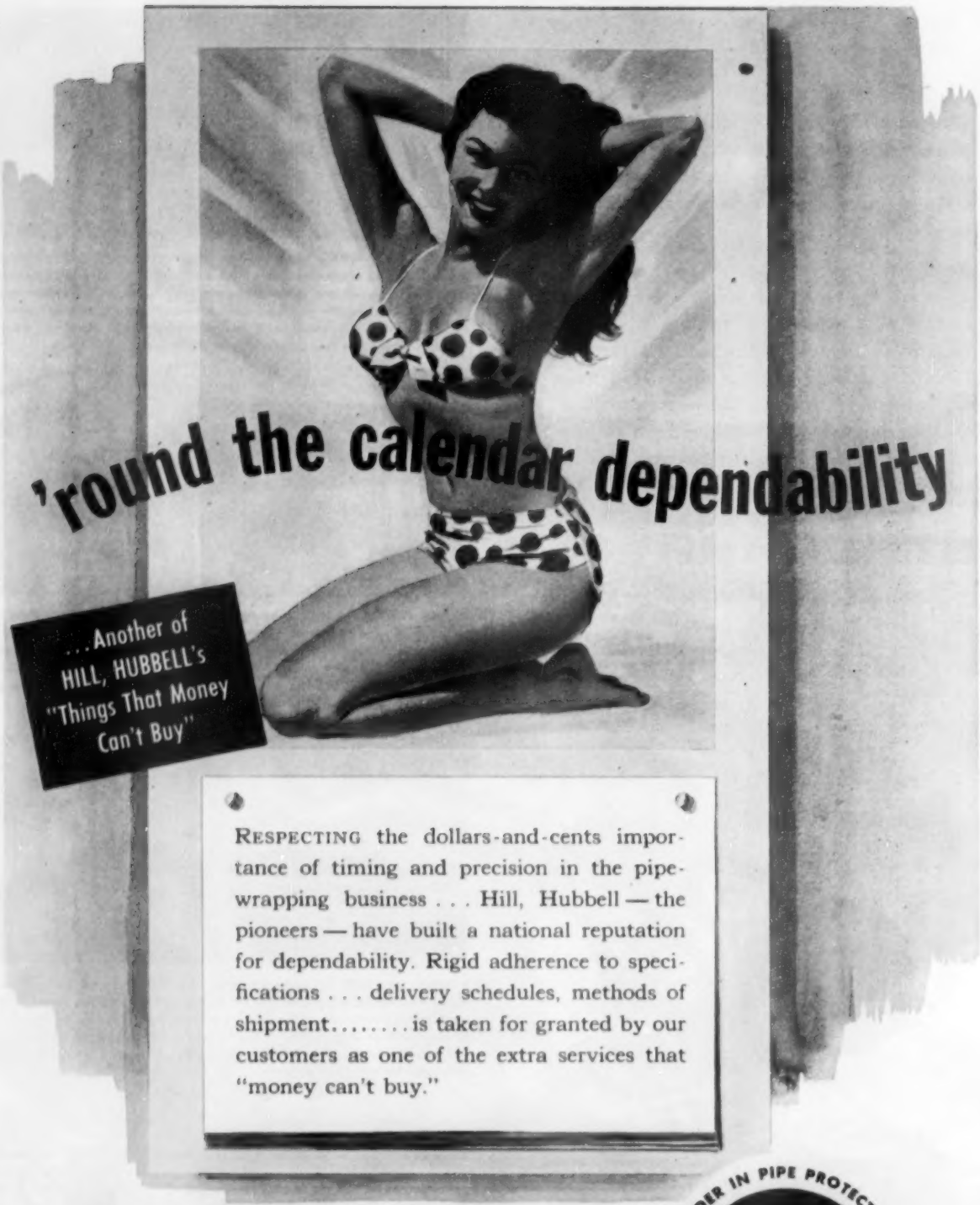


REPUBLIC STEEL CORPORATION
3112 East 45th St., Cleveland 27, Ohio

Please send me literature on:

Republic Line Pipe ☐ Republic Casing & Tubing ☐
Republic Steel Pipe ☐ Republic Plastic Pipe ☐

Name _____ Title _____
Company _____
Street _____
City _____ Zone _____ State _____


'round the calendar dependability
...Another of HILL, HUBBELL's "Things That Money Can't Buy"
RESPECTING the dollars-and-cents importance of timing and precision in the pipe-wrapping business . . . Hill, Hubbell — the pioneers — have built a national reputation for dependability. Rigid adherence to specifications . . . delivery schedules, methods of shipment..... is taken for granted by our customers as one of the extra services that "money can't buy."

HILL, HUBBELL and COMPANY

Factory Applicators of Pipe Coatings and Wrappings

DIVISION OF GENERAL PAINT CORPORATION

3091 Mayfield Road • Cleveland 18, Ohio

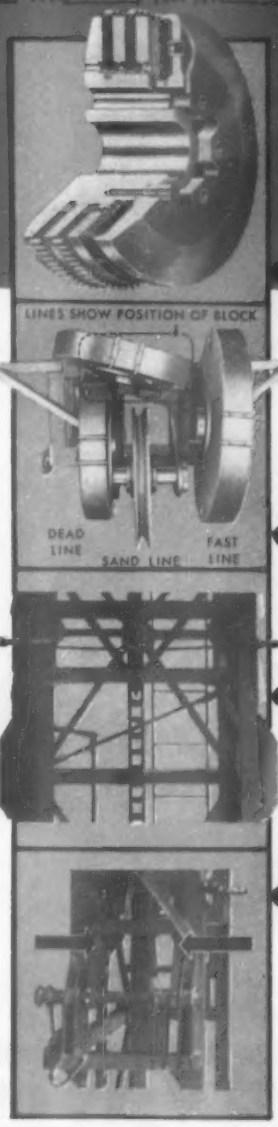
LEADER IN PIPE PROTECTION FOR MORE THAN A QUARTER CENTURY

POWER SPEED SAFETY

SUPER "38" WINCH & SUPER 65' MAST

have these MODERN, EXCLUSIVE Features

All Drives Equipped with WICHITA AIR-TUBE DISC CLUTCHES

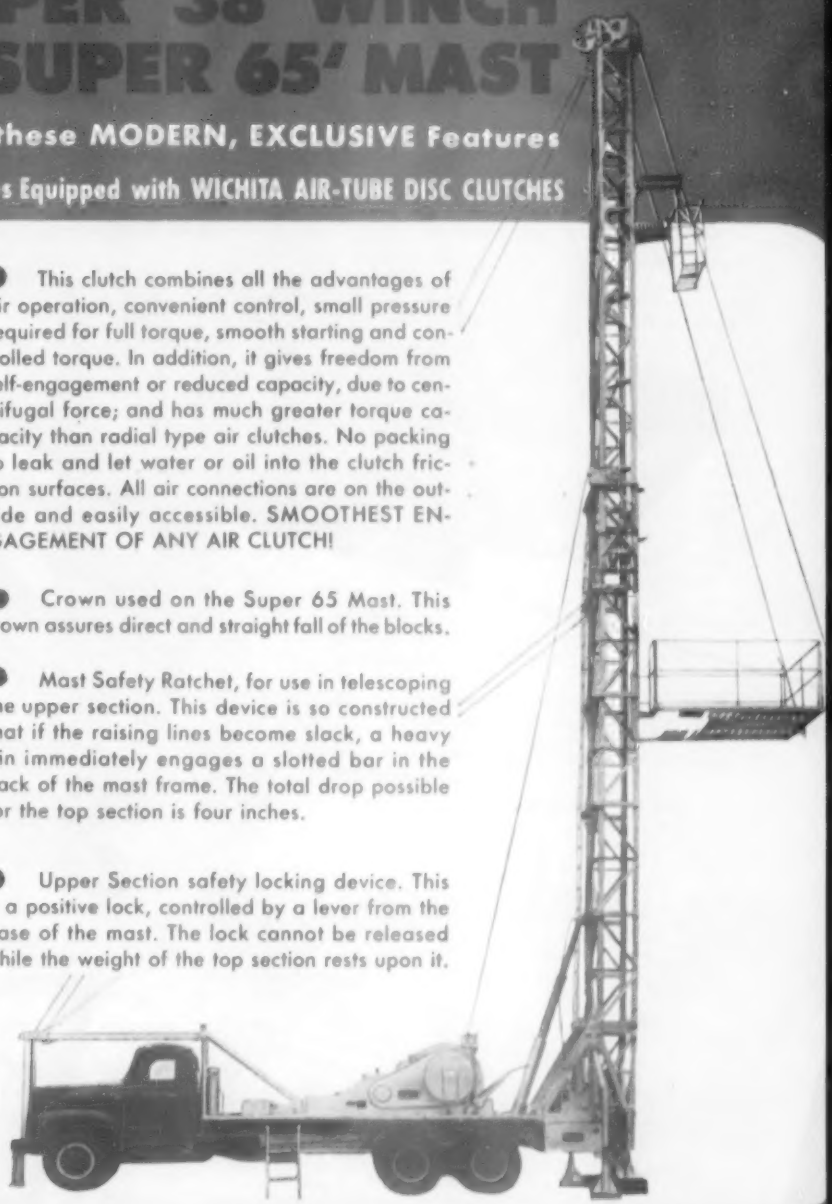


- This clutch combines all the advantages of air operation, convenient control, small pressure required for full torque, smooth starting and controlled torque. In addition, it gives freedom from self-engagement or reduced capacity, due to centrifugal force; and has much greater torque capacity than radial type air clutches. No packing to leak and let water or oil into the clutch friction surfaces. All air connections are on the outside and easily accessible. SMOOTHEST ENGAGEMENT OF ANY AIR CLUTCH!

- Crown used on the Super 65 Mast. This crown assures direct and straight fall of the blocks.

- Mast Safety Ratchet, for use in telescoping the upper section. This device is so constructed that if the raising lines become slack, a heavy pin immediately engages a slotted bar in the back of the mast frame. The total drop possible for the top section is four inches.

- Upper Section safety locking device. This is a positive lock, controlled by a lever from the base of the mast. The lock cannot be released while the weight of the top section rests upon it.



Wilson

THE FIRST NAME IN OIL FIELD WINCHES

WILSON MANUFACTURING CO., Inc.

THE HOME OF RED IRON
WICHITA FALLS, TEXAS
U. S. A.

BE MODERN
BUY WILSON

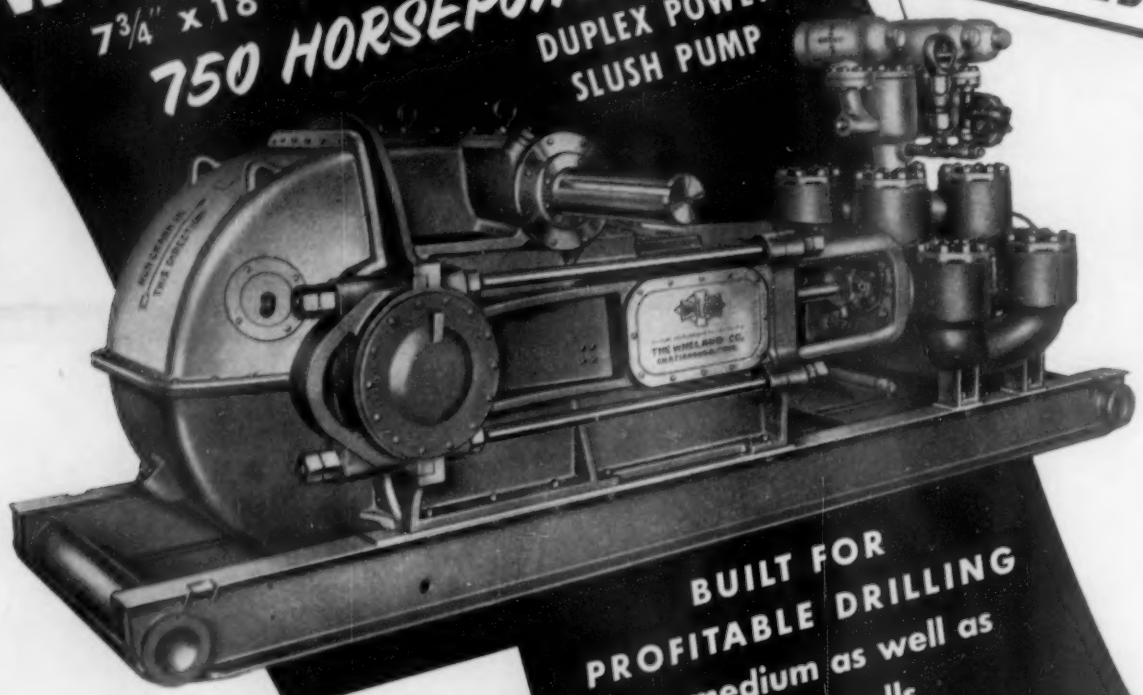
The NEW WHELAND

7¾" x 18" HP-18000

750 HORSEPOWER

DUPLEX POWER SLUSH PUMP

FIELD TESTED



BUILT FOR PROFITABLE DRILLING on medium as well as deep wells

BULLETIN ON REQUEST

THE WHELAND COMPANY
CHATTANOOGA, TENNESSEE, U.S.A.

C. W. ALCORN, VICE PRES.
DAN HELLS EXPANSION BLDG.
HOUSTON, TEXAS

THEODORE N. LAW, PRES.
J. L. STAUSS, VICE PRES.
S. W. JOHNSON, VICE PRES.

FALCON SEABOARD DRILLING COMPANY
EAST SEVENTY-FIRST STANOLIND BUILDING
TULSA, OKLAHOMA

October 18, 1954

Mr. G. P. Street, President
The Wheland Company
Signal Mountain Road
Chattanooga, Tennessee

Dear Gordon:

We know you are interested in the performance of the new HP-18000 Pump we bought from your company.

As we told you on the phone, it drilled its first 12,500 foot well in Oklahoma without even taking off a pot cover.

We selected this pump to go with the rig to drill the deep test near Parkersburg, West Virginia. It continues to do a good job and has well justified its selection. We are pleased with its performance and are getting excellent service. We recommend it highly.

Yours very truly,

FALCON SEABOARD DRILLING COMPANY

Vice President

WHELAND

ROTARY DRILLING MACHINERY

DRAWWORKS • SLUSH PUMPS
ROTARIES • CROWN BLOCKS
TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS & THEIR HEADQUARTERS: Jones & Laughlin Steel Corp., Supply Division, Tulsa, Okla. • Houston Oil Field Material Co., Inc., Houston, Texas • Iverson Supply Co., Tulsa, Okla. • Lucey Products Corp., Tulsa, Okla. • Superior Iron Works & Supply Co., Inc., Shreveport, La. • Industrial Supply Co., Wichita Falls, Texas

EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England.

More and more, leading oil companies and independent oil exploration consultants are using the "Royal Scintillator" to investigate the radioactive "halos" surrounding oil fields. The number of favorable field reports on this technique are increasing daily.

We agree that not enough data is available as yet, however, there is a growing body of opinion which holds that this is a valuable oil exploration aid. Following are excerpts from letters* we have received indicating what some of the leading firms in the country say about our instruments.

"I have used this scintillator extensively prospecting for oil and am amazed at how easily oil trends are defined."—F.V., Salina, Kansas.

"We have made surveys in approximately 30 areas in Kansas, Oklahoma, and Texas. Of 13 drilled, 5 were accurately predicted. The other 8 were in error due to insufficient basic data."—A.B., Ft. Worth, Texas.

"We use Precision Radiation Instruments exclusively having found them the most accurate and constant. Using what we feel is the finest instrument available along with approved geophysical and geological techniques we are able to meet the exacting requirements of our broadening exploratory efforts." R.E.P., Dallas, Texas.

"I purchased a Precision instrument particularly to investigate this radiation pattern. As a member of the AAPG & SEG, I feel qualified to state that your instrument more than justifies your claims both as to the instrument and what it will do when properly used."—L.W.J., Edmond, Oklahoma.

We cannot guarantee that the Model 118 "Royal Scintillator" will locate oil, but we can guarantee that the "Royal" is the best instrument made for investigating the radiation pattern existing around oil fields. It is also the best instrument made for Uranium prospecting, and its use for this purpose should not be overlooked by oil geologists.

For full information contact your nearest dealer or write direct for our free phamphlet on "The Principles of Oil Field Detection with Scintillation Counters" and our complete catalog on Geiger Counters and Scintillators.

*Originals of these letters are on file at our office.

PRECISION RADIATION INSTRUMENTS, INC.

Please send me your FREE oil survey pamphlet and catalog.

Name _____ Title _____

Company _____

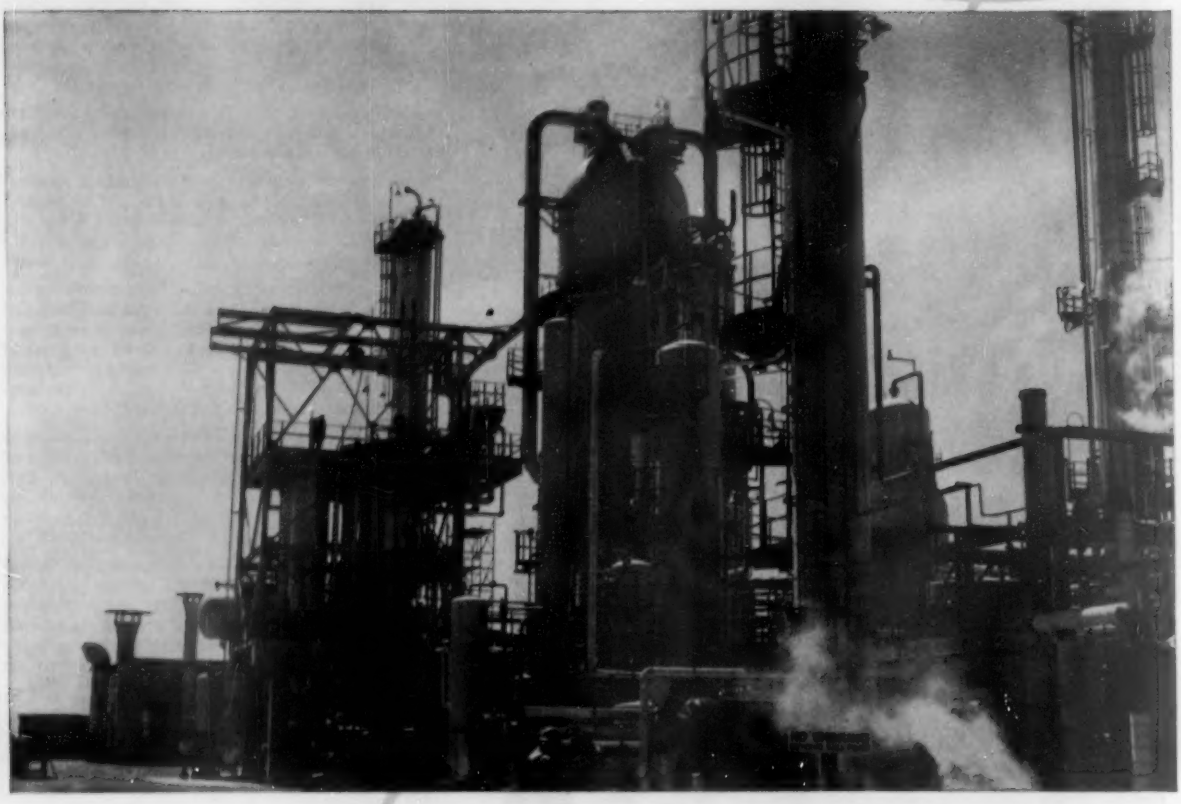
Address _____ City _____ State _____

PRECISION RADIATION INSTRUMENTS, INC.

2235 OG. S. LA BREA AVE., LOS ANGELES 16, CALIFORNIA

World's Largest Manufacturer of Portable Radiation Instruments

Oh, I see



. . . they're using OIC Valves at

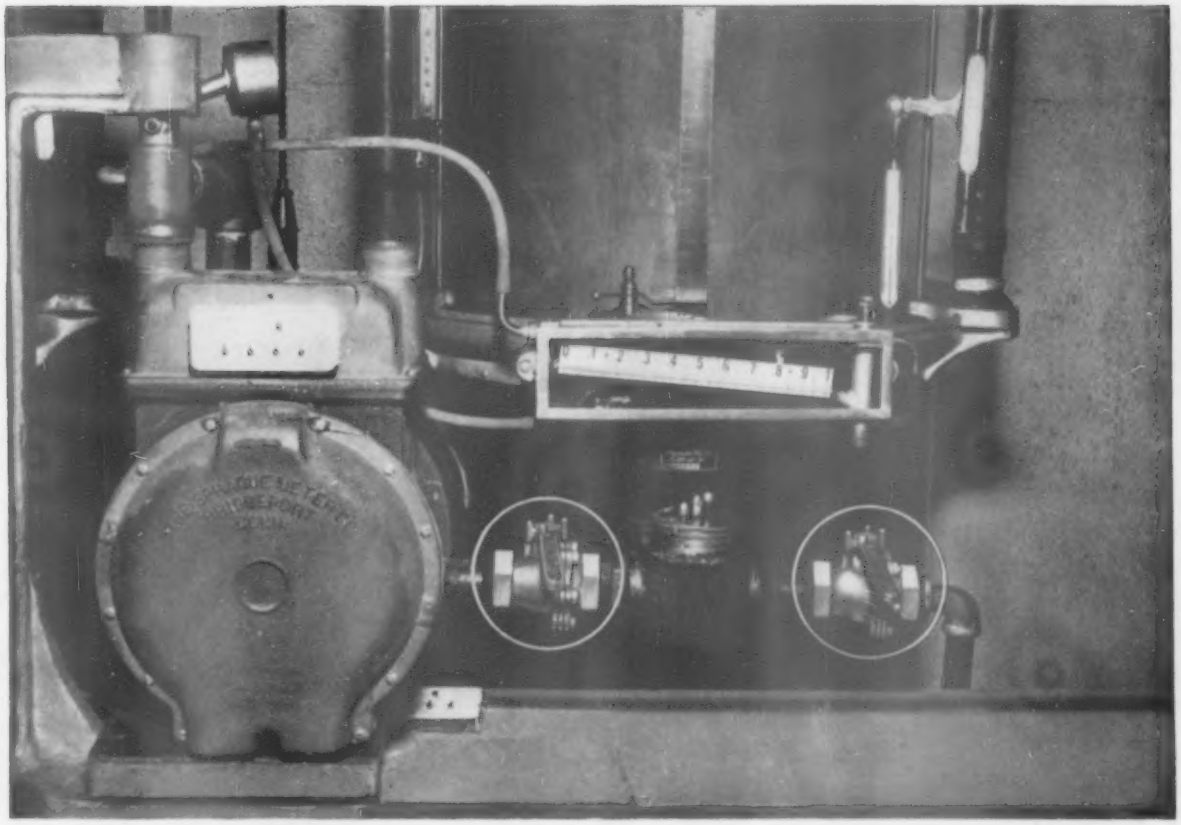
THE BRITISH AMERICAN OIL CO., LTD.

Here at British American's new catalytic cracking unit in Clarkson, Ontario, OIC forged steel valves are adding to the high efficiency and high safety designed into this modern refinery. OIC Valves are also adding the long, trouble-free service which has made them so popular throughout industry.

OIC's new design of forged steel valves offers many exceptional advantages for service where requirements are demanding. Contact your nearby OIC Distributor. Write for Bulletin 195 which gives more information about OIC forged steel valves.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

VALVES | **FORGED & CAST STEEL, IRON & BRONZE, LUBRICATED PLUG VALVES**



Meet the valves that open, close, . . . 1000 times a day!

The Sprague Meter Company, Bridgeport, Connecticut, uses Rockwood Ball Valves in air lines testing gas meters.

One thousand times a day, the valves are opened and closed. Yet they have completed two years' steady service without leakage, without maintenance!

This leakproof trouble-free performance is typical of the way in which Rockwood Ball Valves handle everything from L. P. G. to pickling acids, alcohol to asphalt. Used throughout the petroleum field, their efficiency stems from these four exclusive features —

Full Round Flow — no change in shape or volume of fluid stream — no turbulence — no minimum loss

Quick Opening and Closing — only a quarter turn needed

Longer Wear-Resistance — chrome-plated bronze ball withstands abrasion, pitting and scratching

Leakproof Seal — pressure of fluid automatically positions ball against seat to form tight seal.

If you are not now using Rockwood Ball Valves, send coupon today for complete information. Valves come in all pipe sizes. Tested and listed by Underwriters' Laboratories, Inc.

ROCKWOOD BALL VALVES

FULL, ROUND FLOW

ROCKWOOD SPRINKLER COMPANY
521 Harlow Street
Worcester 5, Mass.

Send me illustrated folder V-4 on Rockwood Full-Flow Ball Valves.

Name_____

Title_____

Company_____

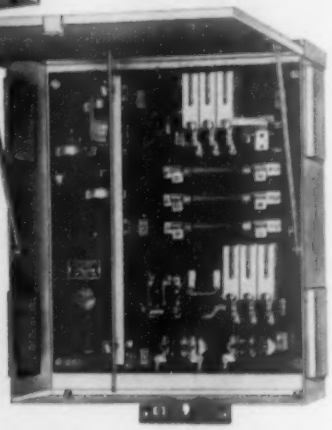
City_____

Zone_____ State_____

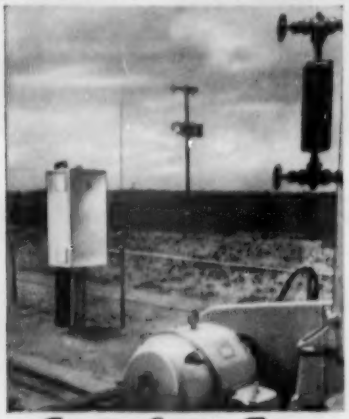
NEW CUTLER-HAMMER OIL WELL PUMPING CONTROL

Cutler-Hammer Program Time Switch for scheduling of pumping cycle automatically. Day-omission feature available.

Improved C-H Oil Well Pumping Control permits easy in-the-field modification to the type of restarting desired after power interruptions.



Lea County, New Mexico



Scurry County, Texas

Matrona County, Wyoming

Incorporates provisions for 3 types of starting. Permits in-the-field alteration to meet changing needs.

The *improved* Cutler-Hammer Oil Well Pumping Control is now ready. It provides the same important features which have made Cutler-Hammer Oil Well Pumping Control so widely preferred in the past. But in addition, it now permits easy *in-the-field* modification of each unit to include further operating features frequently desired.

Some oil well operations require a control that restarts a pump motor automatically after a power outage. Other operations make control equipped with low voltage relays desirable . . . so each pump motor is restarted manually after power is restored. Still others desire control units equipped with automatic timers to provide the same staggered restarting automatically.

The new Cutler-Hammer Oil Well Pumping Control permits the quick and easy incorporation of any of these restarting features by two changes in the basic construction of the unit. First, the panel of the control is drilled at the time of manufacture to allow easy mounting of either the low voltage relay or the automatic timer. Second, a diagram inside the cover shows all circuit arrangements with leads numbered to permit easy change of wiring. This new standardized construction does not alter the operation of the control when used WITHOUT relay or timer but does permit easy *in-the-field* incorporation of either of these features when desired.

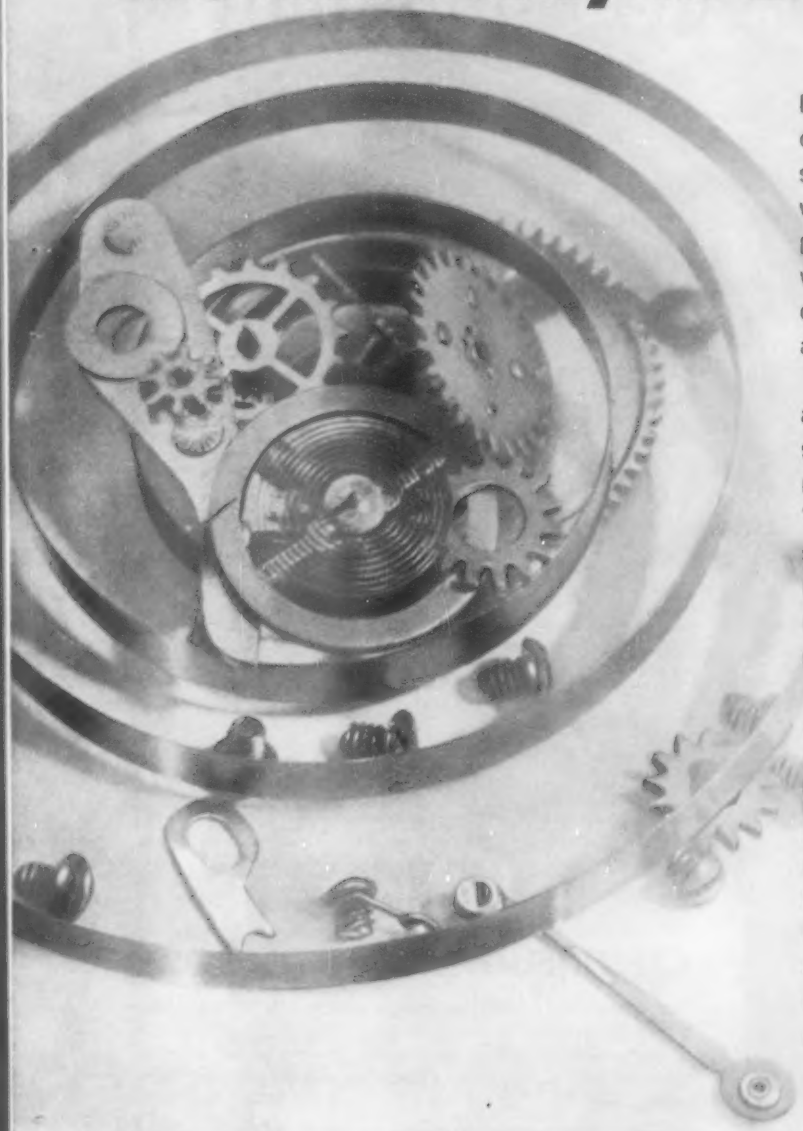
And in this control you get the following widely preferred features. Aluminized case to repel sun's heat. Chimney-draft ventilation for cooler operation. Cool, dust-safe vertical contacts. Protected openings that keep out dirt, dust and bugs. Optional 3-coil overload protection against single phasing. Flexible program time switch for scheduling and for day omission. Non-"blow up" lightning arrestors, etc., etc., etc.

Ask to see this new control now. Or write for descriptive bulletin. CUTLER-HAMMER, Inc., 1453 St. Paul Ave., Milwaukee 1, Wisc. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

MEMBER AMERICAN PETROLEUM INSTITUTE

CUTLER-HAMMER
MOTOR CONTROL
C-H

The Hard Way to Buy a Refinery



Buying a petroleum refinery in "pieces" from different sources, each with its own design standards and materials specifications, is somewhat like buying a watch the same way. An expert can put the units together and make them work. But it's a lot simpler, and usually more economical, to buy the complete "package"—assembled and already running when you get it.

When planning a new refinery, or modernizing an existing one, there are many economic reasons why it pays to have a single contractor responsible for integration of the entire project. These include centralized purchasing power; shorter and flexible construction schedules; uniformity of design factors in process equipment; and the elimination of duplicate construction managers and their staffs.

The M. W. Kellogg Company, world's leading designer and builder of petroleum refineries, offers a complete "packaged-plant" contract to the petroleum and petro-chemical industries. It covers process engineering; plant design and construction of the entire job, including off-site installations such as tanks, loading facilities, docks, roads; supervision until on stream; and a production guarantee. We welcome the opportunity to discuss with you the many advantages of The M. W. Kellogg "packaged-plant" contract.

M.W. Kellogg

ENGINEERING FOR TOMORROW

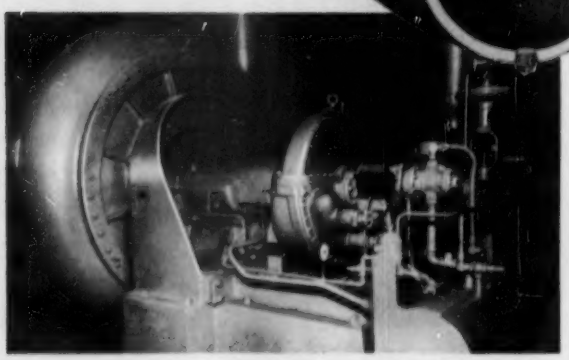
THE M. W. KELLOGG COMPANY, NEW YORK 7, N. Y.

The Canadian Kellogg Company, Limited, Toronto • Kellogg International Corporation, London.

SUBSIDIARIES OF PULLMAN INCORPORATED

Accent on rugged simplicity

CASING AND BACKPLATE of cast Meehanite. All surfaces adjacent to the impeller are machined to close tolerance.
ONE-PIECE, OPEN TYPE IMPELLER develops no end thrust, mounted on tapered shaft and readily removable.
BASE AND HOUSING of heavy fabricated steel, strong and rigid.
INLET CONNECTION AND GUIDE VANES of cast Meehanite.



Typical installation of an Elliott compressor handling 25,000 inlet cfm of air, at a discharge pressure of about 2.5 psig; driven by Elliott 300-hp steam turbine at 3300 rpm.

P4-8

ELLIOTT

CENTRIFUGAL COMPRESSORS

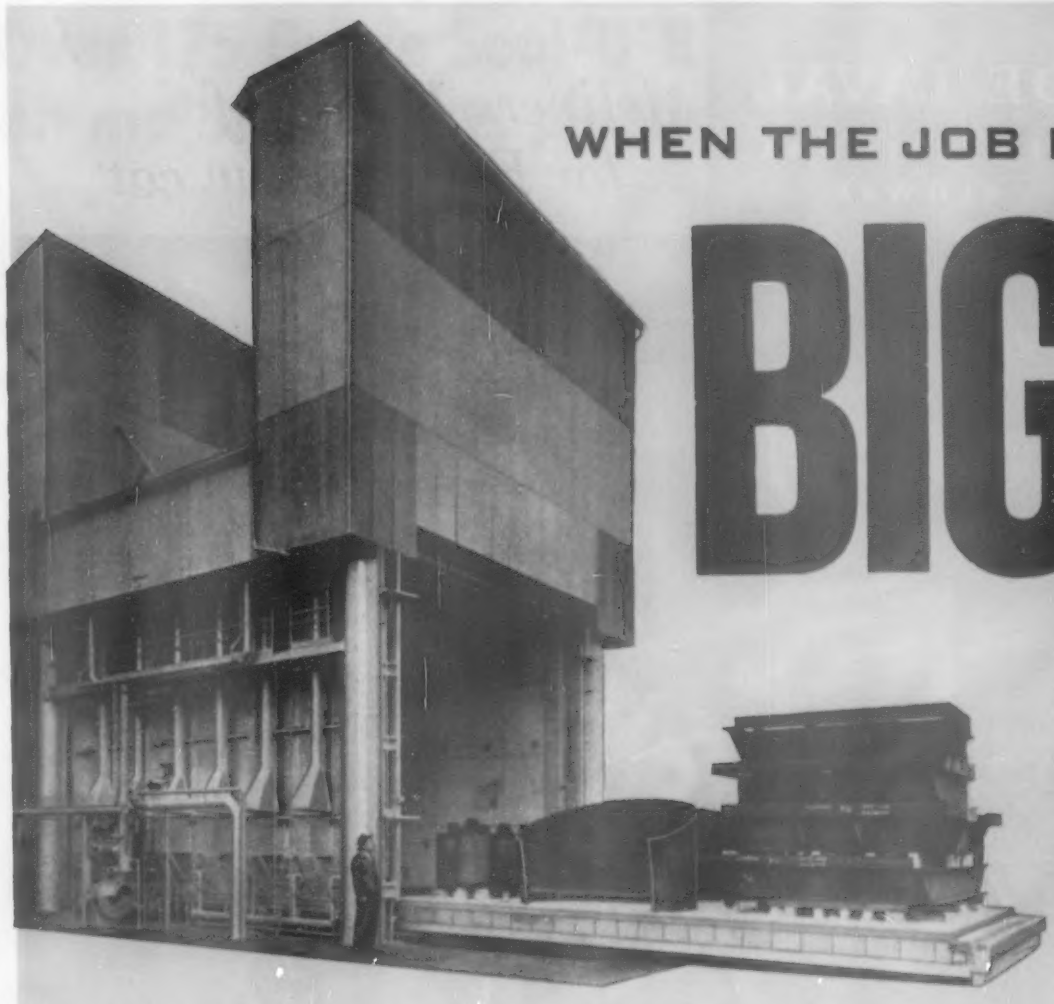
are extremely simple in design and construction. Hundreds are serving in processes requiring the handling and compression of large quantities of air or gas. All parts in contact with the gas to be handled can be made of suitable materials.

Elliott compressors are made in both single-stage and multistage types, for pressures up to 1000 psig, with capacities to 175,000 cfm. Elliott Company also builds the motor or turbine drive, including speed-increasing gears when required.

For details and specifications consult your local Elliott field engineer, or write Elliott Company, Centrifugal Compressor Dept., Jeannette, Pa.

ELLIOTT Company

TURBINE-GENERATORS TURBINES MOTORS GENERATORS DEAERATING HEATERS EJECTORS CONDENSERS COMPRESSORS TURBOCHARGERS TUBE CLEANERS STRAINERS



WHEN THE JOB IS

BIG

Showing control side and loaded car-hearth of giant 20' x 20' x 30' stress relieving oven. Shipments of large assemblies by rail or water can be handled.

• • • • this Willamette Iron & Steel Co. car-hearth stress relieving oven can handle the work. It is typical of the up-to-the-minute plant facilities available at Willamette. Here the latest in tools and machinery, and the best in experienced manpower—mechanical and structural designers and draftsmen—are ready to serve private industry, the heavy construction field and the Federal, State and Municipal Governments.

Inquiries are invited.

Willamette

SERVING THE WEST *in the west...*
SERVING THE EAST *from the west...*

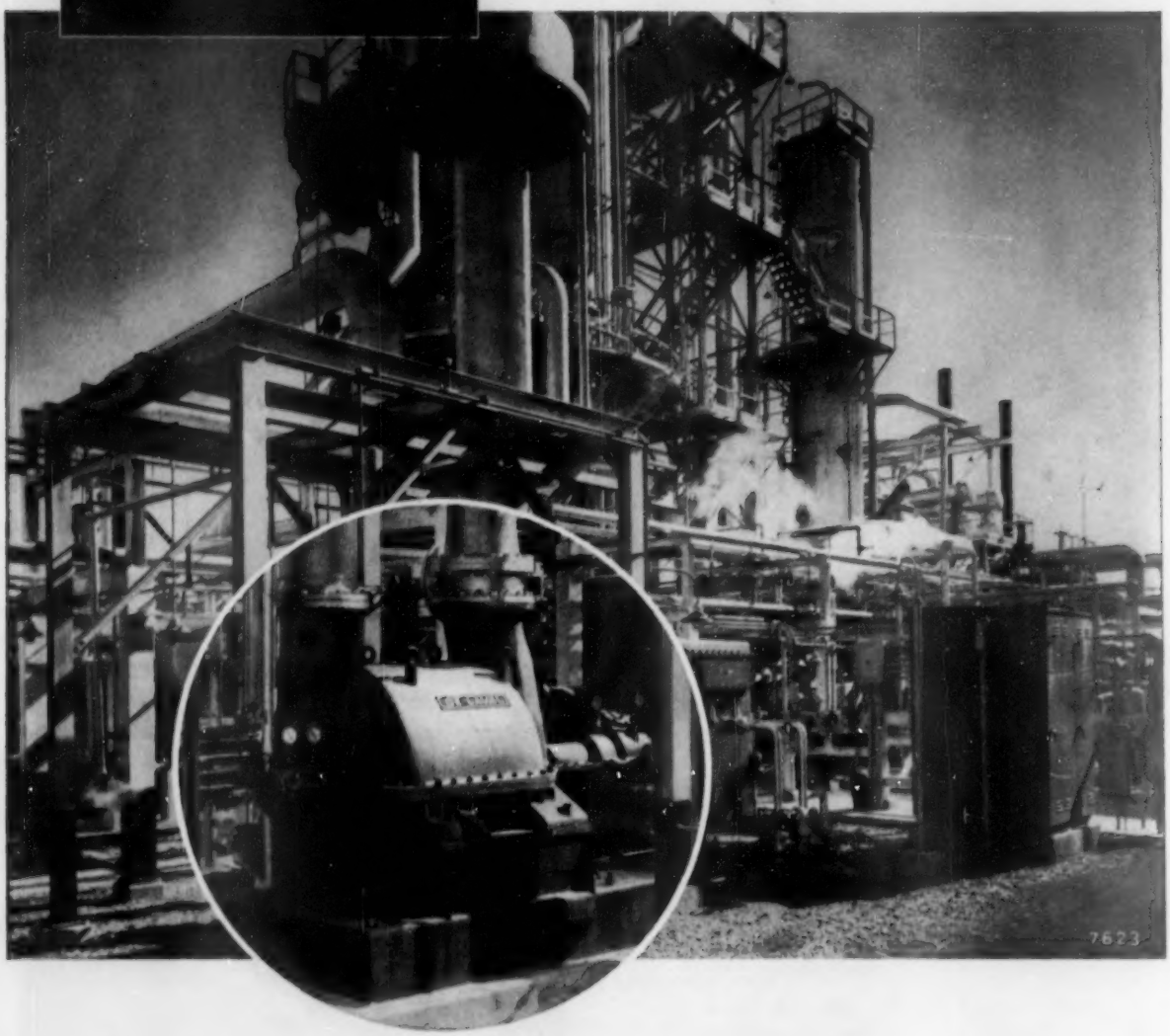
Write for our latest brochure

WILLAMETTE
Iron and Steel Co.

2800 N. W. FRONT AVENUE • PORTLAND 10, OREGON

DE LAVAL CENTRIFUGAL BLOWER

delivers 17,400 cfm for Elreco's new cat



This De Laval Centrifugal Blower, on stream at the El Dorado Refining Company's new cat cracker at El Dorado, Kansas, supplies 17,400 cubic feet of air per minute for regeneration of the spent catalyst.

This plant, built in record time of ten months by The Refinery Engineering Company, is designed for a charge capacity of 4,300 barrels per day at 75% conversion.

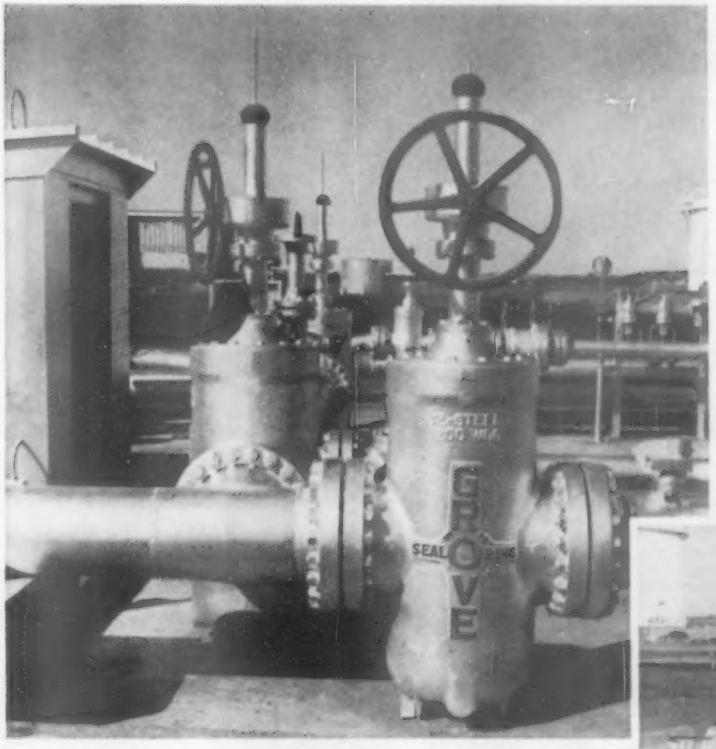
Elreco is another of many refineries which have chosen De Laval for dependable blower performance under heavy-duty, continuous operation. Rugged castings, husky, perfectly balanced rotor and externally mounted, cylindrically seated bearings are design features that reduce maintenance and insure long service. Send for Bulletin 0500 containing complete data.

DE LAVAL *Centrifugal Blowers*

DE LAVAL STEAM TURBINE COMPANY

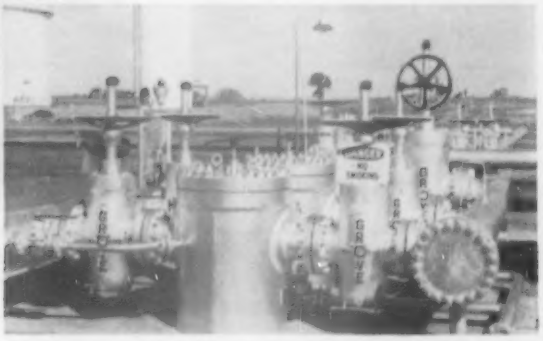
810 Nottingham Way, Trenton 2, New Jersey

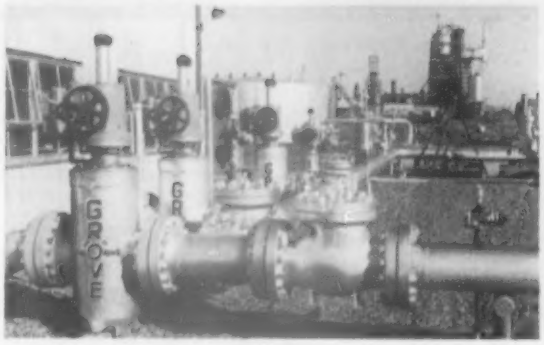
Over 175 Grove Seal-"O"-Ring Gate Valves on major products pipeline...



provide dead-tight seal...without lubrication or sealing compound!

- NO PRODUCT CONTAMINATION
- NO LUBRICATION SERVICE PROBLEMS





Over 175 Grove Seal-"O"-Ring Gate Valves are in operation on the Oklahoma Mississippi River Products Line extending from Duncan, Oklahoma to West Memphis, Arkansas. Illustrated here are some of the varied applications at the Duncan and Fort Smith stations.

Particularly important on product lines is the fact that Grove Seal-"O"-Ring Gate Valves maintain dead-tight seal and full freedom of operation without lubricants or sealing compounds which might contaminate products. For the full story on Seal-"O"-Ring Gate Valve performance . . . available from 2" to 36" sizes . . . for products, gas, or crudes . . . contact your Grove representative today.

408

GROVE SEAL-"O"-RING Gate Valves

GROVE VALVE and REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, California
HOUSTON 4—1901 Calumet St. • **LOS ANGELES 6**—1930 W. Olympic Blvd. • **NEW YORK 17**—415 Lexington Ave.

ODESSA, TEXAS TULSA, OKLAHOMA LAFAYETTE, LA. CHICAGO, ILL. DENVER, COLO.

GROVE SEAL RING GROVE SIMPLICITY ACCURACY SAFETY

Why is Dunham Tanks forging ahead?

(NO 2 IN A SERIES OF 10 ADS.)

NEW ADVANCED GB TREATER

better because...

economical

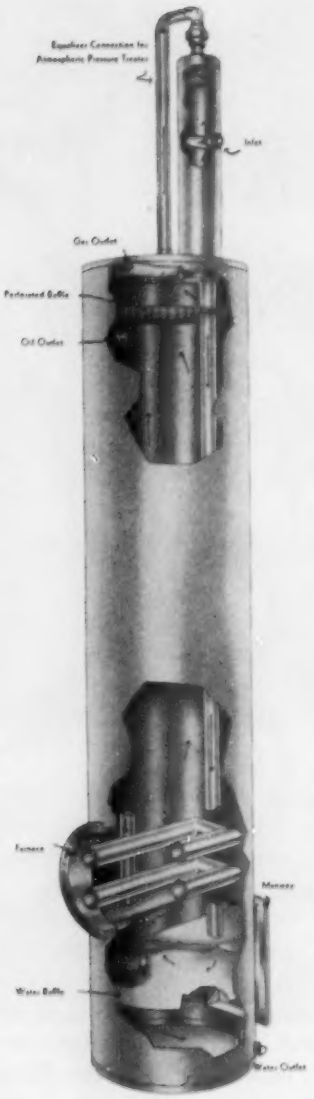
LOW initial, installation, maintenance and operating COSTS!

efficient

Extra large free water capacity; proven double U-tube furnace that can operate with 3½ lbs. pressure on the dome and flume, giving the furnace gas and retaining the atmospheric pressure on the treating section at the same time!

new design

NEW gas separating dome to accommodate heading conditions, free water section, oversized furnace, larger cleanout manway, and stabilized treating section!



Products:

Welded and Bolted Steel Tanks, Steel Stairways and Walkways, Vertical and Horizontal Oil & Gas Separators, Emulsion Heaters and Treaters, Indirect Gas Heaters, Cold Separation Units, Two Stage Separation Units, Gas Dehydration Units, Three Phase Separators, Free Water Knockout, Servel Refrigeration Units and LeRoi Compression Units.

ANDERSON-DUNHAM, INC. DUNHAM TANKS TANK DIVISION

DUNHAM TANKS

Division of Anderson-Dunham, Inc., Baton Rouge, La.

Offices and Stocking Points: Shreveport, La.; Lafayette, La.; New Orleans, La.; Seminole, Okla.; Perry, Okla.; Ardmore, Okla.; Kilgore, Tex.; Corpus Christi, Tex. (Lester Moore Tank & Supply Co.); Odessa, Tex.

They Say—

Exploration in Canada

"While Alberta continues to produce by far the greatest share of Canadian crude oil, an important development, nevertheless, is the broadening out of the area recognized as good oil country. A healthy increase has taken place in Saskatchewan . . . and a whopping jump took place in Manitoba to bring it also into the ranks as an oil province . . .

"For my money, I am confident also that oil eventually will be found in commercial quantities in British Columbia, where large quantities of gas already has been discovered, and that the Northwest Territories and the Yukon will also provide their share. Even in the Arctic, large salt domes exist which could mean greatly increased reserves of oil for us once exploration got under way . . ."

J. Gerald Godsoe, vice president of British American Oil Co., Ltd., in an address before the Electric Club of Toronto.

"Angry Action"

"Texas has reacted typically to the importance of foreign oil. It has raised its allowable to permit companies operating in Texas to produce and market more oil.

"Just what has been accomplished can't be immediately seen. Putting more oil into a glutted market may or may not be an effective antidote. But the Texas viewpoint is that it has suffered more than its fair share because of the foreign oil and resents such a situation. Raising the allowable . . . helps Texas oil operators and further damages those of Oklahoma and other oil states.

"But perhaps good can come from this angry action. At least the Texas gesture serves to remind the nation's lawmakers that foreign oil is a problem which should be coped with—and very soon."

Editorial in the Shawnee, Okla., News-Star.

Higher Allowables May Mean . . .

". . . All the oil states that have increased their allowables are rationaliz-

IT TAKES MORE THAN *Wishing* TO ANSWER EMERGENCY FIELD SERVICE!

LELAND "PACKAGED UNIT"

LELAND POLE TRAILERS

LELAND SELF-LOADING FLOAT SEMI-TRAILERS

LELAND TANDEM SELF-LOADING FLOATS

TULSA WINCH Equipment, Parts, Service

• #$%&?¼#" GET THAT TRUCK UP HERE QUICK! Many a foreman has bellowed that. And when that truck is brought up . . . it better deliver! When thousands of dollars hang on emergency performance, the boss takes it for granted that no mistakes have been made in design or fabrication.

On hundreds of daily jobs, the Leland "Packaged Unit" Oil Field Truck Body confirms this confidence with workhorse performance beyond the call of duty. The "Packaged Unit" is the most versatile truck body in use today. Each feature is designed for maximum efficiency . . . maximum safety. The "Packaged Unit" is supplied with gin poles . . . a heavy duty winch can be mounted at your option.

Leland EQUIPMENT COMPANY

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Guiberson
Casing Swab
with "GW" Cups

FLEXIBILITY

that means every-drop casing swabbing!

GUIBERSON "GW" CUPS

**hug casing wall—
automatic seal,
controlled pipe contact**

- Unequalled in rough or mixed casing strings
- Stout, flexible lip brings up every drop
- Won't down-swab or hang on casing collars
- Perfect for unloading shallow wells
- Abrasion resistant compound — takes up own wear
- Performs better — lasts longer — costs no more
- Interchangeable on the Guiberson Casing Swab

Guiberson Swab with "GW"
and "K" cups offers greatest
size range on the market.

Better Be Safe Than Sorry!

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

ing greater production on the basis of competition from foreign oil. . . .

". . . If foreign oil has been flooding the market before allowables were increased the general surplus centainly wouldn't be reduced by taking the lid off domestic production.

"Before chaos is allowed to develop, the increase in domestic allowables may have the salutary effect of making some reduction of imports imperative. Certainly this long-standing problem should have been brought to a head before now."

Editorial in the Daily Oklahoman, Oklahoma City.

Takes Journal With Him

Dear Sir:

In answer to your enclosed inquiry, you are advised that my change of address is only temporary . . .

The reason for the St. Anthony Hotel (San Antonio) address is that I am supervising the drilling of a very important wildcat in the northwestern portion of Zavala County, Texas . . . As the drilling is likely to consume some 3 or 4 months, I am maintaining my personal headquarters in the St. Anthony Hotel. As this is a very important well involving a number of imposing problems of drilling in an untested area, engineering, mud control, geology, and pure Texas speculation, and as I am not an engineer, geologist or expert in any of these lines, I felt it necessary to have my favorite yellow book at hand always to assure that I should make no mistakes . . .

Arthur Harvey
Vice President
Tex-Harvey Oil Co.
Midland, Texas

Dark Spot in the Rockies

"Montana is depriving itself of untold invested capital because of stringent and arbitrary actions of its state land board . . .

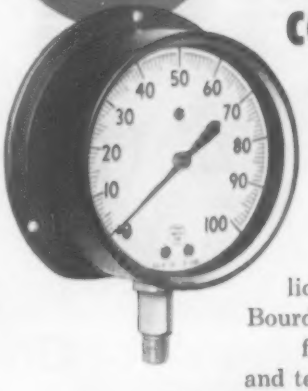
"Taxes on crude-oil production in Montana are among the highest of any of the 30 oil-producing states. . . . An arbitrary nondrilling penalty of $2 per acre has been demanded of all operators holding state oil and gas leases. The $2 drilling penalty is assessed on all state leases if a well is not commenced within 2 years, regardless of location or the extent of experimental development. The drilling penalty has been an important factor in the cancellation of more than 50 per cent of Montana state school land leased acreage.

"The State Board of Land Commissioners was primarily responsible for declaring the 1953 Oil and Gas Lease Act amendments unconstitutional. The land board's action has made it impos-

an ACCO product

Helicoid Chemical Gage

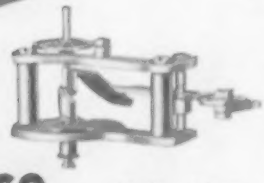
Gages for corrosive chemicals and liquids up to 5000 p.s.i.



• Here's an accurate pressure gage for chemicals and other viscous liquids which might corrode or clog the Bourdon Tube. It registers working pressures from 30" vacuum to 5000 p.s.i. and temperatures to 400°F. Guaranteed accuracy plus or minus 1%. A single diaphragm seals off objectionable substances from the indicating gage. This gage is filled completely with specific inert liquids and pressure is transmitted directly to the indicating gage through deflection of the sealing diaphragm.

FEATURES

• HELICOID GAGES cost less in the long run because they give long, trouble-free service with a minimum of maintenance. The movement is a simple cam and roller design that does not have any gear teeth to wear out. It has been tested and proved in years of hard service.



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Helicoid Gage Division
AMERICAN CHAIN & CABLE

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Pressure • Vacuum • Compound

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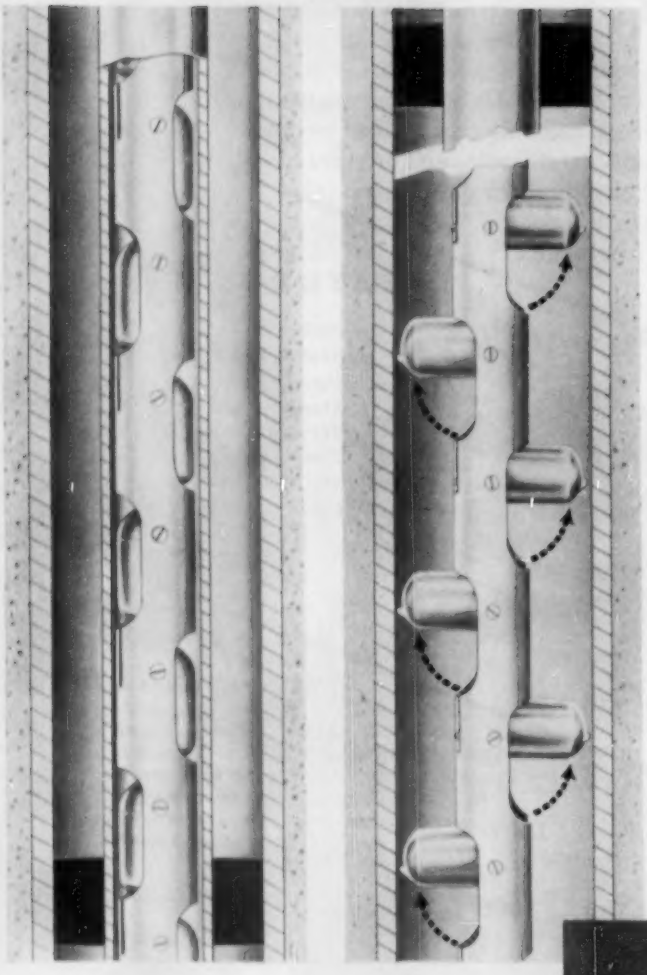
Case Histories Showing The New Welex is Giving



As shown at left, the Swing Jet carrier runs smoothly down 2-inch tubing in closed position.

At right, full-powered jets are snapped into position at firing zone.

How Welex Swing Jets Give Better Permanent-Type Completions

It's a Welex Development!

The newest and finest perforator for permanent completions—the Welex Swing Jet—was entirely developed, tested, *proved* by the company who originated jet perforating—Welex Jet Services, Inc. Now well past the field-testing stage (used in more than 1,000 wells to date), the Welex Swing Jet is bringing in better wells in every field where it is used!

Why Swing Jets Are Tops!

Cleaner completions give you greater production from your well. Swing Jets complete under water or oil, giving the clean, large entrance holes that mean increased pressures and a better flow!

Welex Swing Jets Give Effective Penetration!

Swing Jets are centralized in your casing when fired—offsetting well pitch—and giving you *four effective shots per foot*, with deep penetration into the formation.

Welex Swing Jets Are Safe for Your Well!

Swing Jets are designed to operate at up to 10,000 p.s.i. and 300° Fahrenheit, and can not be fired unless every jet is in the correct firing position. And Swing Jets can be retrieved even after jets have been opened to firing position . . . without damage to your tubing!

Use Welex Swing Jets on Your Next Permanent-Type Completion

Call on the company with the greatest Swing Jet experience—the company that developed this great new tool.

ORIGINATORS OF Welex JET PERFORATING

Welex JET SERVICES, INC.

Swing Jet

Completions with Larger I. P.

Gulf Coast

In Zapata County, a gas well had been perforated and was making only one-half million cubic feet. One run with the Welex Swing Jet to perforate 12′ at four holes per foot resulted in an immediate increase to one million cubic feet. A test four months later showed the well was producing 4 million cubic feet.

West Texas

A well in Andrews County had been set up for a permanent type completion in order to economize completion costs. The mud in 5½″ casing was displaced with oil, and open-end tubing with a hook-wall packer was run to a point just above the perforating zone. A single run was made with the Welex Swing-Jet to perforate the interval 12,606′ to 12,619′, four holes per foot. Before Welex equipment could be moved from the location, the well was cleaning and flowing to pits without chemical or hydraulic treatment.

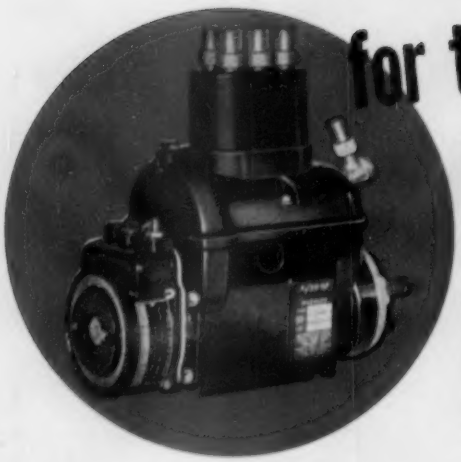
Oklahoma

In Grady County, Welex Swing Jet was used to perforate 20′ from 10,225′ to 10,245′ at 8 holes per foot. Following three swabbing runs, the well flowed 94 barrels of oil per hour. A test two months later showed same rate of flow and zone had not been treated in any manner.

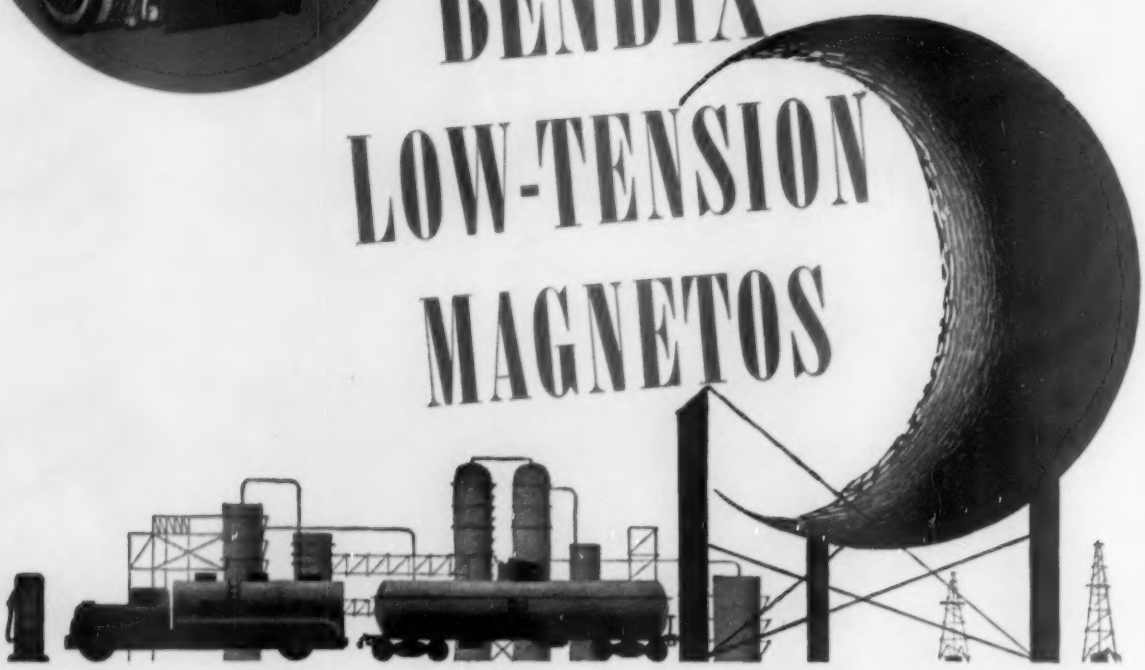
Additional data and identification of the wells above can be obtained by writing Welex Jet Services, Inc., Fort Worth.

General Offices: 1400 East Berry, Fort Worth, Texas • *Division Offices:* Houston • Midland • Tulsa • Oklahoma City
District Offices: Abilene - Ardmore - Bartlesville - Beaumont - Corpus Christi - Falfurrias - Gainesville - Great Bend - Hobbs
Houston - Lafayette - Liberal - Odessa - Pampa - Pauls Valley - San Angelo - Shawnee - Stillwater - Victoria - Wichita Falls

Designed for the Petroleum Industry—



BENDIX LOW-TENSION MAGNETOS



It's the magneto designed to eliminate fire hazard, foremost problem of the petroleum industry. The special ventilating arrangement of the Bendix Low-Tension Magneto permits air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

In addition to this important safety feature, Bendix Low-Tension Magnetos actually reduce engine maintenance and operating costs. For example, spark plug erosion is reduced to a minimum. The distribution of low-tension voltage to the high-tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with the conventional distributor. Variable or fixed sparks can be obtained by internal adjustment.

For safety and low operating costs it will pay you to specify Bendix Low-Tension for all your magneto requirements. Complete data available on request.

- **Low Plug Erosion Rate**
- **Breaker Type Distributor**
- **Ventilation without Fire Hazard**
- **Radio Shielding Available**
- **Variable or Fixed Ignition**

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sible for the State of Montana to lease any of its state-owned school lands for oil and gas development . . .

"The obstacles posed by unreasonable and discouraging actions of the state land board has made Montana one of the darkest spots in the Rocky Mountain region . . ."

Fred E. Woodring, executive vice president of the Rocky Mountain Oil and Gas Association, in an address at a Fort Worth meeting of the Mid-Continent Oil and Gas Association.

Natural Gas Supply

"There is not an oversupply of natural gas in this United States. Lots of people think there is, but that is not the case.

"I have a good many clients, and you would be surprised how many of them are looking right now for more gas and having trouble getting what they want. I would say that the natural-gas business is in good shape and it will stay in good shape if they keep on finding more gas. If they don't keep on finding more gas, they are going to get into bad shape awfully fast . . .

"To get more gas, people have got to have a chance to make some money. I don't know why people would go out drilling wells when nine out of ten they drill are going to be dry holes if when they do get some gas they don't have a chance to make some money . . . I think that the law of supply and demand will keep the price to the point where people will drill. If they get so much gas they don't need to drill, the price will go down . . ."

Ralph E. Davis, Houston oil and gas consultant, during a Federal Power Commission hearing.

CALENDAR

1955

JANUARY

17-18 Kansas Oil Men's Association, annual convention, Baker Hotel, Hutchinson, Kans.

17-19 Pipe Line Contractors Association, annual convention, Hotel Statler, Los Angeles.

26-28 Symposium on instrumentation for process industries, A. & M. College of Texas, College Station, Tex.

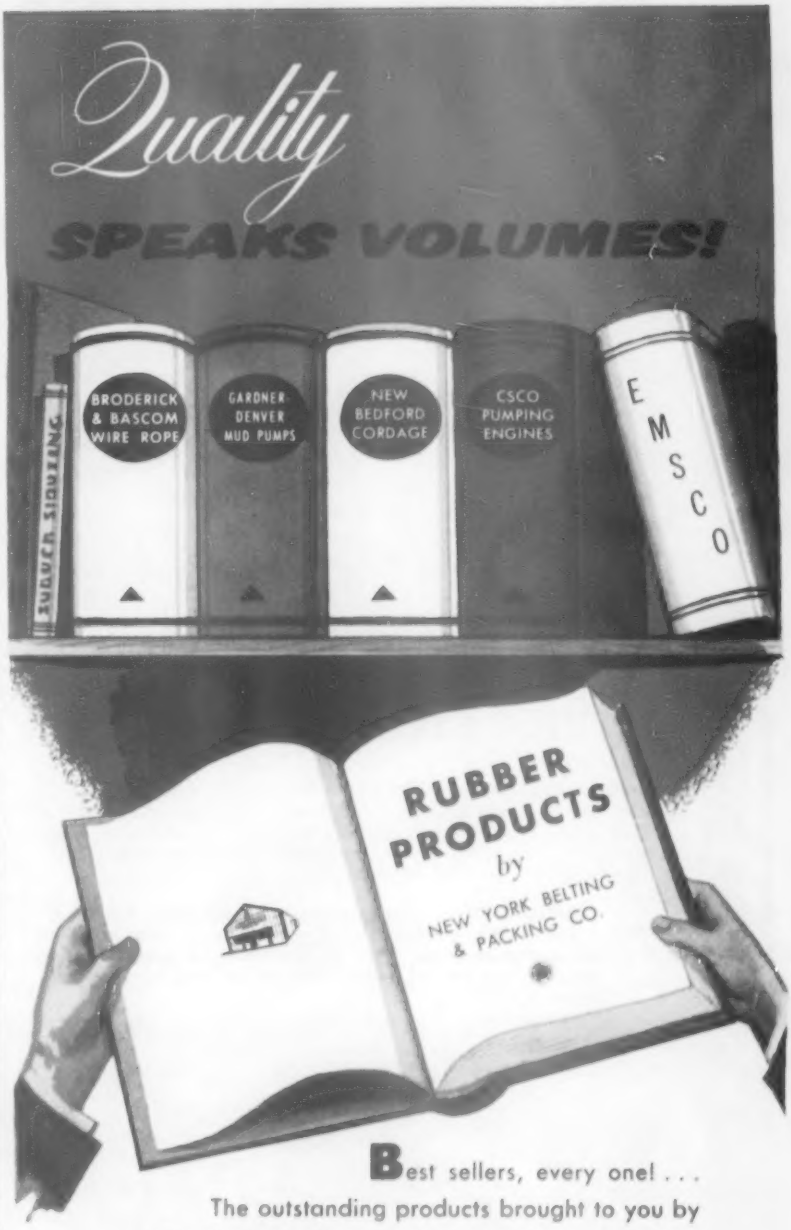
27-28 American Chemical Society, symposium on hydrocarbon chemistry, Rice Hotel, Houston.

27-28 Southern California Meter Association, fourth annual instrument short course, Los Angeles Harbor Junior College, Wilmington, Calif.

31-Feb. 2 Sixth annual Southeastern Symposium on Industrial Instrumentation, University of Florida campus, Gainesville, Fla.

FEBRUARY

10-12 Seventh Southwestern IRE Conference



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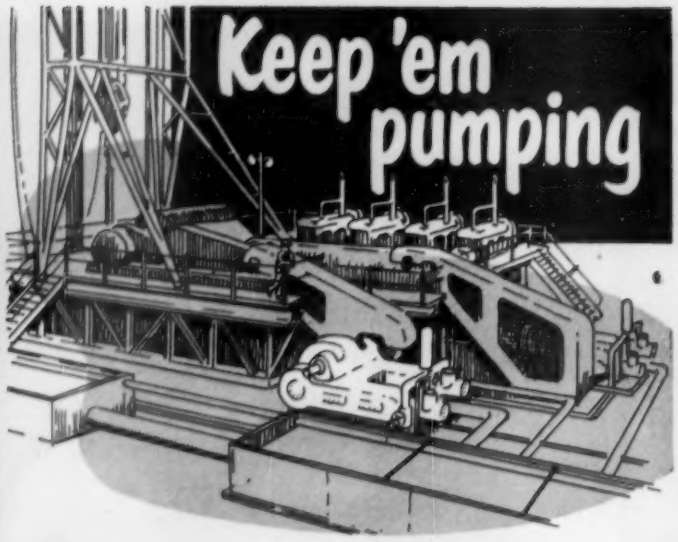
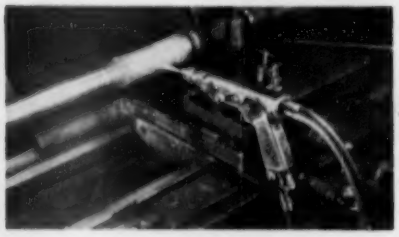


Colmonoy No.6 hard-faced Slush Pump Rods stay in service Five Times Longer!

Prevent unnecessary shutdowns to replace worn rods and packing. Use rods that are hard-faced with COLMONOY No. 6. This miracle alloy has great resistance to abrasive and corrosive conditions, and is so smooth it reduces stuffing box repacking to a new minimum.

COLMONOY No. 6 is sprayed on in powder form, making a smooth, even overlay. This is *welded* to the rod with an oxy-acetylene flame. Only finish grinding is needed to put the part into service, to last 5 times as long as it would before hard-facing.

COLMONOY No. 6 is used on various pump and valve parts throughout the producing field and the refinery. Write us for the name of your nearest shop doing Spraywelding.



Above is a pump rod being Spraywelded with Colmonoy No. 6. At left is a slush pump rod that has been hard-faced with Colmonoy No. 6.

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and Electronics Show, Baker Hotel, Dallas.

13-17 American Institute of Mining and Metallurgical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

13-18 A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston.

14-16 Rocky Mountain section of A.A.P.G., annual regional convention, Billings, Mont.

16-18 National Association of Corrosion Engineers, sixth annual short course for pipeliners, Mayo Hotel, Tulsa.

23-24 Pacific Coast Gas Association, seminar on electronic data processing, Los Angeles.

25 National Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

1-2 American Gas Association committee on natural gas reserves, Baker Hotel, Dallas.

4 Southern Gas Association, transmission management conference, Shamrock Hotel, Houston.

7-11 National Association of Corrosion Engineers, Palmer House, Chicago.

9-11 American Petroleum Institute, Division of Production, Southwestern spring meeting, Jung Hotel, New Orleans.

17-18 Southern Gas Association, Distribution Management Conference, Jung Hotel, New Orleans.

20-23 American Institute of Chemical Engineers, Kentucky Hotel, Louisville.

23-24 Pacific Coast Gas Association, accident prevention conference, Santa Barbara, Calif.

23-25 American Petroleum Institute, Division of Production, Mid-Continent District, Herring Hotel, Amarillo, Tex.

27-29 Texas Independent Producers and Royalty Owners Association, ninth annual meeting, Hotel Texas, Fort Worth.

28-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Exploration Paleontologists and Mineralogists, annual meeting, Hotel Statler, New York.

28-April 1 American Society for Metals, 9th western exposition and congress, Pan American Auditorium, Los Angeles.

APRIL

5-7 Corrosion control short course, sponsored by University of Oklahoma and Central Oklahoma Section of National Association of Corrosion Engineers, University of Oklahoma Extension Study Center, Norman, Okla.

7-8 Rocky Mountain District, American Petroleum Institute, Division of Production, Gladstone Hotel, Casper, Wyo.

13-15 Natural Gasoline Association of America, annual convention, Baker and Adolphus hotels, Dallas.

13-15 American Society of Lubrication Engineers, tenth annual meeting, Hotel Sherman, Chicago.

13-15 National Petroleum Association, 52nd semiannual meeting, Cleveland Hotel, Cleveland.

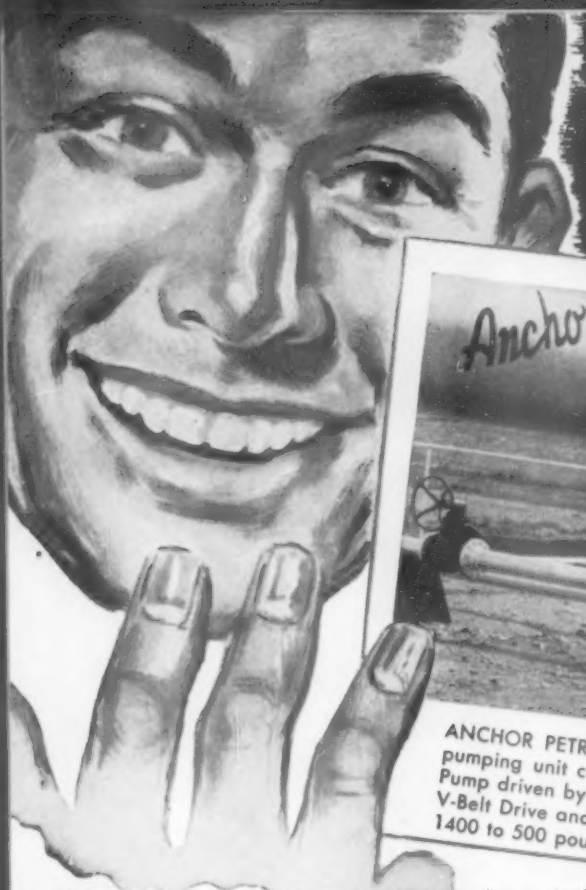
18-20 American Society of Mechanical Engineers, spring meeting, Lord Baltimore Hotel, Baltimore.

19-20 Pacific Coast Gas Association, distribution conference, Phoenix.

19-21 Southwestern Gas Measurement Short Course, North Campus, University of Oklahoma, Norman, Okla.

20-22 Petroleum Industry Electrical Asso-

GASO PUMP PERFORMS *TRIPLE SERVICE* IN 60,000 BARREL UNDERGROUND STORAGE PLANT



ANCHOR PETROLEUM'S UNDERGROUND STORAGE PLANT near Bath, N. Y. The pumping unit consists of a Fig. 1742 2½" x 5½" x 10" Gaso Duplex Piston Power Pump driven by Model 145-GKU Waukesha Power Unit, complete with steel skids, V-Belt Drive and Guard. Capacity from 38 GPM to 330 GPM at pressures from 1400 to 500 pounds.

The flexibility of Gaso Pumping Units is dramatically demonstrated in the installation pictured above, one of several operated by Anchor Petroleum Company:

1. **In less than 90 days, operating in winter weather, the Gaso Pump washed out salt formation to give Anchor a 60,000-barrel underground storage reservoir.**
2. **Since then the pump has been storing gas in the cavity at a rate of 300 GPM.**
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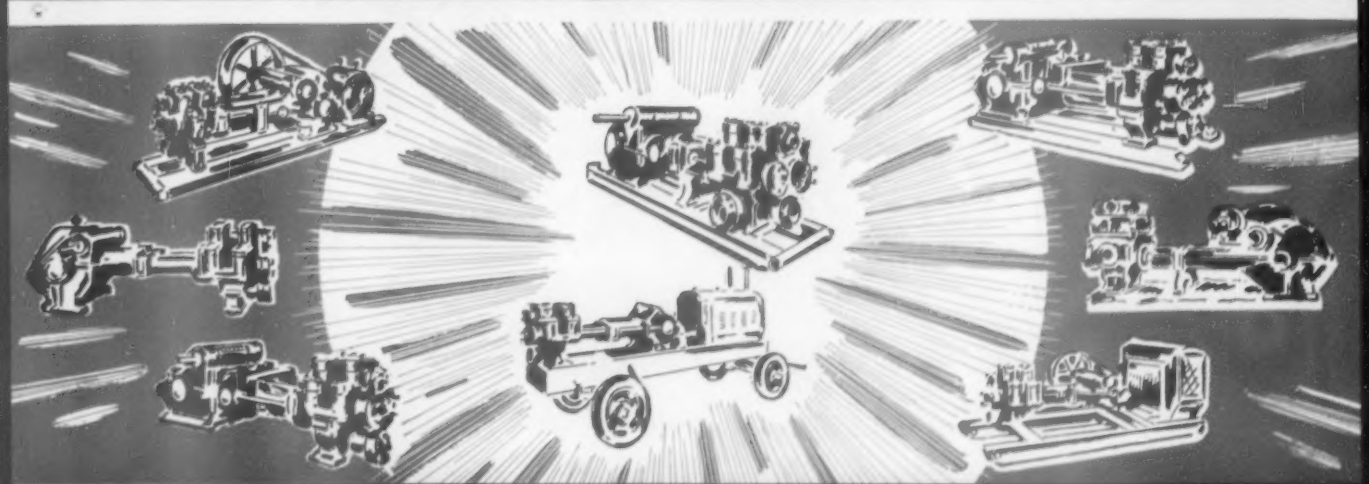
for every oil industry need



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Tuboscope can be depended on to bring the best in new methods of non-destructive testing of oil field tubular goods.
Tuboscope COMPANY
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ciation, annual conference, Shamrock Hotel, Houston.

25-26 Independent Petroleum Association of America, midyear meeting, San Antonio.

28-29 American Petroleum Institute, Division of Production, spring meeting of Pacific Coast district, Statler Hotel, Los Angeles.

MAY

1-4 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.

1-4 American Institute of Chemical Engineers, Shamrock Hotel, Houston.

9-10 American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Jefferson Hotel, St. Louis.

11-12 Pacific Coast Gas Association, gas supply and transmission and conference of technical session, Palm Springs, Calif.

11-13 American Petroleum Institute, Division of Production, Eastern District spring meeting, William Penn Hotel, Pittsburgh.

12-19 Sixth Latin American Congress of Chemistry, Caracas, Venezuela.

14-22 World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt Germany.

16-18 American Petroleum Institute, Division of Transportation, products pipeline conference, Edgewater Beach Hotel, Chicago.

16-18 Southern Gas Association, New Orleans.

23-25 American Petroleum Institute, Division of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

26-27 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington.

30-June 1 Chemical Institute of Canada, thirty-eighth annual conference and exhibition, Quebec City, Que.

JUNE

5-9 Canadian Gas Association, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont.

6-10 American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.

6-15 Fourth World Petroleum Congress, Rome, Italy.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

9-10 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

11-15 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alberta, Canada.

12-17 Society of Automotive Engineers, golden anniversary summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

16-18 Interstate Oil Compact Commission, Denver.

20-23 American Society of Mechanical Engineers, semiannual meeting, Statler Hotel, Boston.

28-July 1 American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

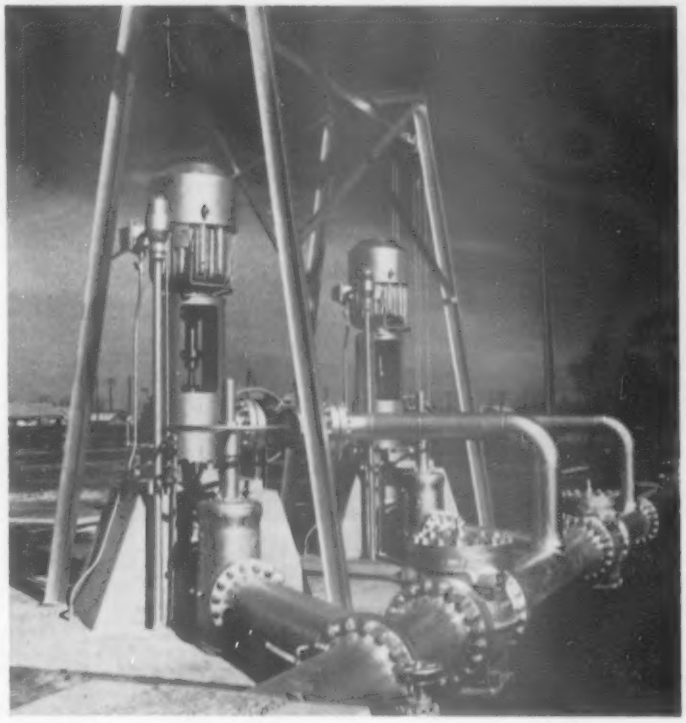
AUGUST

15-17 Society of Automotive Engineers, golden anniversary West Coast meeting, Hotel Multnomah, Portland, Ore.

FOR THE *Best* IN BOOSTER LINE SERVICE

use JOHNSTON vertical turbine pumps

JOHNSTON VERTICAL PUMPS



Setting a high standard for excellence, Johnston Vertical Turbine Pumps are widely used for booster line service for pipelines, refineries, and chemical plants throughout the world. Unlimited flexibility of installation, with discharge heads to fit any system, makes these pumps highly popular with design engineers. For crude oil, gasoline, diesel fuel, ammonia, L-P gases and other volatile fluids, Johnston Pumps are dependable, easy to install, economical to operate.

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To keep the fleet rolling, General American's more than 30 car repair shops work with the Engineering and Traffic departments to give shippers more dependable service for transporting liquids in bulk.

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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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●

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JOURNALLY Speaking

Historical Notes

BEFORE this year 1955 gets very far along, we think we should call attention to the fact that it is the anniversary of two historic events which, sort of, have a bearing on the oil industry.

It is the 700th anniversary of Marco Polo, the Italian explorer who traveled all through Asia, spent 20 years as adviser to the Mongol emperor, Kublai Kahn, and came home to write the world's first travelog. One of the things he saw was petroleum, seeping out on the shore of the Caspian Sea near Baku and being used for lighting and heating.

Marco told his fellow Italians all about this thirteenth century petroleum industry, but he also told so many other strange things that nobody would believe a word he said. So the world had to wait 600 years without oil until Yankee ingenuity took over where Marco Polo's friends stopped and made petroleum into a real industry.

This year also is the 500th anniversary of the Gutenberg Bible, probably the first book printed from movable type in the Western World. That started the art of printing, and 450 years later along came the Oil Man's Bible, the biggest magazine ever printed of any type, the Big Yellow Book that's done ever so much more for the oil industry than Marco Polo's book ever did.

Curious how the web of history finally works out, isn't it?

Paths of Progress

THE marvels of technological progress in the petroleum industry never cease, but there are always new challenges ahead.

Item: In India, radio sets are now being made which operate from a kerosine lamp. Some sort of juxtaposition of dissimilar metals when heated by kerosine produces enough juice to operate a set without batteries, thus bringing the blessings of soap operas and disk jockies to millions who have been able to escape them for lack of electricity.

Item: The industry has been making candles out of petroleum wax for nigh onto 100 years, and now comes the announcement that one company has perfected a dye that will make Christmas candles hold their color from one year to the next. But what's really needed is a nonmelting additive that will make Christmas candles hold their shape when stored in the attic all summer. You should have seen what last year's Oklahoma heat did to ours.

Item: Lubricating oil has been improved by all sorts of additives to perform all kinds of functions, but a reader comes along with a request for a new one. He hasn't worked out all the details, but he has unlimited faith in the ability of the industry's scientists to perfect the scheme.

"Some years ago this brainstorm hit me," he writes. "It's an idea for night-driving safety. Why don't oil companies impregnate motor oil with a substance (you figure out what chemical) that will illuminate the roadway? Some iridescent, phosphorescent stuff that when the oil leaks out, as it does on all highways, will reflect from the headlights' glare. Then there's the effect of a broad ribbon of oil slick that sort of shines in the dark. Possible? Give it a thought."

Sounds like a bright (get that pun?) idea. Only something would have to be worked out to prevent motorists from being lured to destruction by glowing globs of iridescence on telephone poles and bridge abutments where other drivers had piled up and leaked all their illuminating lubricants.

Still Rolling

THE oil industry's proud boast that it took this country out of the horse-and-buggy age is a bit premature, according to research by the National Geographic Society. There are still several buggy manufacturers doing a thriving business. One factory in Indiana issues a catalog listing some 50 models. And half of its production goes to Louisiana, a big oil-producing state. Those Cajuns may motorize their pirogues, but they still use buggies where the swamp is too dry to float a boat.

Henry D. Ralph.

duplex

DUPLEX

.....a good name to remember

Baker DUPLEX Cement Wash-Down Whirler Float Shoe — Product No. 360

WHAT YOU CAN DO WITH BAKER DUPLEX EQUIPMENT

successfully cement liners, combination strings, and perform certain types of two-stage cementing.

cement blank sections of pipe below a perforated section, without any need to use auxiliary equipment.

wash out cavings ahead of the string when setting a liner. Without DUPLEX Equipment you can circulate only through the topmost perforations—with DUPLEX you can circulate clear to bottom.

you can control the amounts of materials used, and (without change) run caustic or oil, then run plastic, in sequences and quantities as desired.

you eliminate the need for auxiliary equipment (such as retainers or retrievable cementers) when you use Baker DUPLEX.

you can use DUPLEX equipment either with or without a liner hanger.

you have complete control of the liner at all times when DUPLEX Equipment is used. The liner can be raised or lowered, and is positively held down in place while cementing.

a bridging ball can be dropped (after cementing) and circulation carried on above the DUPLEX Equipment without disturbing the green cement.

Baker Combination Product No. 383 with a DUPLEX Whirler Float Collar. Cement is held above the Metal Petal Basket.

How DUPLEX Equipment is made

DUPLEX Float Shoes and Collars are similar to other Baker Float Shoes and Collars in most features, but have a female left-hand thread assembly (of drillable cast iron) accurately anchored just above the Back-Pressure Valve. By means of a mating male Left-Hand Square Thread Sub, the cementing string is easily connected to (or disconnected from) the DUPLEX Shoe or Collar.

How DUPLEX Equipment Operates

In simple liner work, a DUPLEX Wash-Down Whirler Float Shoe is connected to the bottom joint and the balance of the liner is run into the well, with the last joint held in slips or clamps. A cementing string of sufficient length then is run to connect the male Left-Hand Square Thread Sub to the female left-hand assembly in the shoe, to form a quick, fluid-tight connection.

The portion of the cementing string above the liner is then run, with the DUPLEX connection carrying the weight of the liner. After cementing, the back-pressure valve prevents any flow-back of cement slurry placed outside the liner. The cementing string is then disconnected by rotating to the *right;* excess cement washed out; and the cementing string removed from the well.

Various combinations of Baker DUPLEX Equipment are used to perform more complex operations, such as cementing behind liners at different levels; cementing above and below cavities; between producing zones; and similar work.

The Baker representative or office nearest you is available to discuss proper use of Baker DUPLEX Equipment in your well completions.

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GUIDING, FLOATING AND CEMENTING EQUIPMENT

DUPLEX

"Market demand" gets a new twist

A REVERSE twist is being put on the term "market demand" as applied to crude production. It is supposed to mean limiting output to what the market can reasonably be expected to absorb without waste.

Now it seems to mean boosting a state's output to whatever share of the market its producers demand.

That appears to be what happened in several southwestern states last month. With January demand expected to be up no more than 2 per cent over December, January allowables were set an average of 6 per cent higher.

A modest seasonal increase in production was in order, and the market probably can absorb the additional crude for a couple of months provided allowables are trimmed back when stocks begin to rise at the end of the heating season. However, the January allowables were not set in recognition of a seasonal increase in market demand but rather in response to pressure from political forces.

IN TEXAS A PRIMARY MOTIVE was irritation at continued high imports. The idea was to force or scare imports out of the market, or to put the onus on importers if the price should fall as the result of glutted markets.

Some other states, which held steady when Texas took the brunt of curtailment, blithely reasoned that if Texas can go up now they can too, so up they went.

Oklahoma was the brashest of all. Its "market demand" hearing ignored testimony on the amount of Oklahoma crude the market needed but gave great weight to the demand of producers that they get a bigger market and to their argument that refiners will buy their crude if it is forced upon them.

But the greatest influence was Governor-Elect Gary, who blandly told the hearing that the state treasury needs the taxes on production of a certain number of barrels of Oklahoma crude during the coming year. So January allowables were upped 10 per cent under what is locally coming to be known as a "revenue demand" hearing, or the "Cash and Gary Plan."

IT MAY DEVELOP THAT THE MARKET can be forced to absorb all the oil that producers demand that it consume, but if so it will prove that the classical principles of economics and the original concept of market-demand proration have been wrong all along.

When there is a surplus supply of any other commodity, about the only way a producer can get a bigger share of the market is to reduce his price. This could happen in oil if production is set by the size of the market demanded by producers rather than by the volume of demand in the consuming market.

YOUR MOTOR FUEL NEEDN'T LOSE ITS PEP . . .

IS WITHIN YOUR GRASP

Blending with Warren NATURAL GASOLINE will give it the RETAINED VOLATILITY so necessary for superior performance after it reaches the fuel tanks of your customers.

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THIS WEEK . . . . . IN THE NEWS

GOVERNMENT—The Census Bureau starts measuring the economic muscles of the oil industry for the first time since 1939. . . . Survey will make a complete count of all oil and gas wells in the country; will cover production, gas-processing, refining and marketing as well. . . . One segment of the census will cover offshore operations for the first time. . . . ¶Cabinet Committee splits on vital points, blocking submission of recommendations to the President on energy sources and supplies. . . . Scheduled to reach the White House by December 1, the report will be delayed another month. . . . Settlement of proposed Eastman Kodak antitrust suit before it was filed may become pattern for settling similar suits involving oil industry. . . .

SALES—General American of Texas makes its fourth big deal in 6 months by paying more than $20,000,000 to Bradley Oil for properties in West and West Central Texas. . . . Bradley acquired the properties last year from the former Condor Petroleum Co. . . . The deal involves 183 wells producing about 3,600 bbl. daily. . . . ¶Aztec Oil & Gas lays $4,000,000 on the line for oil and gas leases and production in New Mexico, Utah, and Colorado. . . . Southern Union Gas, Aztec's former parent firm, was the seller. . . . ¶Tennessee Gas Transmission moves into a new section of the Rockies by purchasing 83⅓ per cent interest in Far West Oil. . . . ¶McAlester Fuel gets 53 producing wells in West Texas in a deal with Brown & Thorp. . . .

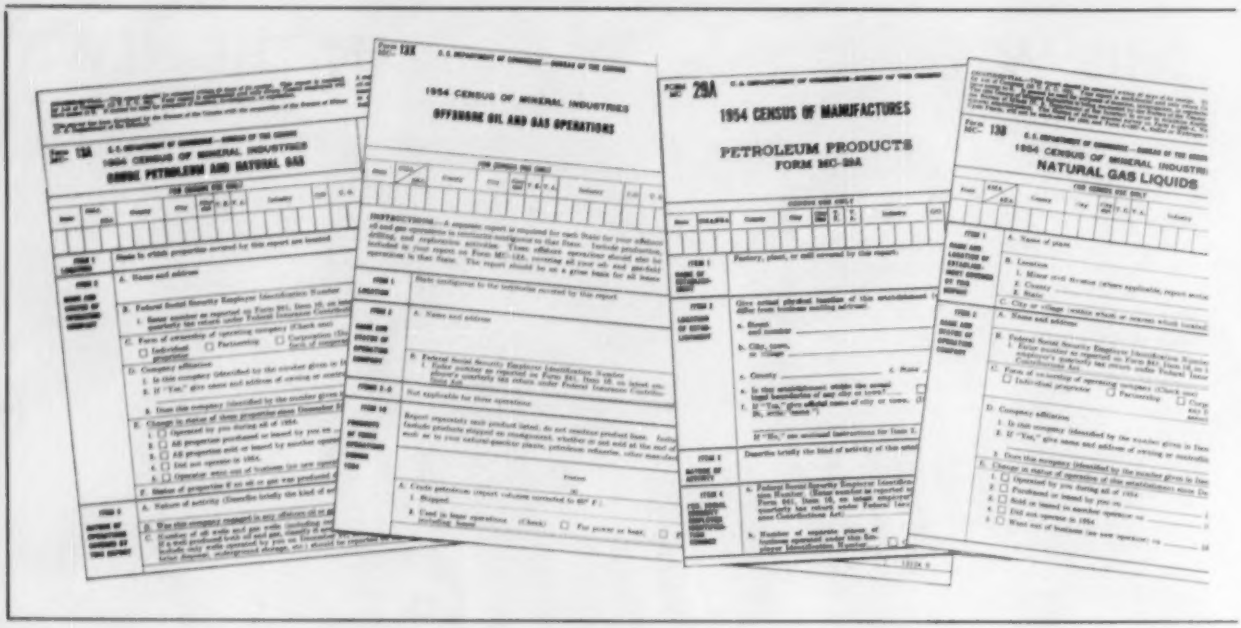
THESE LINES, RESEMBLING HUGE, SILVER BOA CONSTRICTORS, snake their way over a sheet-metal building at the terminal of Kuwait Oil Co., Ltd., a Gulf Oil Corp. and British Petroleum Co., Ltd., subsidiary in Kuwait. This small shaikhdom on the Persian Gulf is currently producing more than 925,000 bbl. of crude oil daily. Oil handling and shipping in Kuwait involve movement through relatively short lines to a large tanker jetty which can load eight supertankers at one time. In addition, submarine lines provide loading space for five tankers. On the shore back of the jetty, the company operates a 30,000-bbl. topping plant which provides products for domestic requirements and bunkers for ships' fuel.

REFINING—Shell Development has perfected a liquid-liquid extraction apparatus that will save refiners money. . . . The unit—operated commercially in six refineries—costs less to build and operate. . . . ¶Esso Standard and Humble Oil & Refining are marketing a new premium gasoline with a 98 research octane rating. . . . This new high in octanes gives strength to the belief that 100-octane fuel is just around the corner. . . . ¶Tide Water will close its Watson refinery in the Los Angeles area, switching the load of the 14,000-bbl. plant to the 100,000-bbl. refinery at Avon. . . . ¶A new refinery will be constructed in southern Ontario by Supertest Petroleum. . . .

INTERNATIONAL—Crude production in Venezuela has started another upswing. . . . Output averaged more than 2,000,000 bbl. daily for the first time in November. . . . ¶Domestic producers also must compete with new sources of crude in Europe and the Middle East. . . . Completion of a pipeline system has led to first commercial production of Rumaila field in southern Iraq. . . . Development continues at Sicily's first oil field, which recently started production. . . . ¶Israel, still intent on becoming an oil-producing country, is the scene of an intensive drilling program, financed partly by U. S. and Canadian capital. . . . ¶Newcomer in Cuba has prospective oil producer near Echeverria discovery. . . .

NATURAL GAS—Hearings before the FPC this week could settle some of the tangled legal problems involved in federal regulation of natural-gas producers. . . . Lawyers, however, don't expect the decisions, if they are forthcoming, to cast much long-range light on the problems involved. . . . If the FPC doesn't decide in favor of the producers, they are certain to go to court. . . . Industry believes the FPC has adopted a "sue us" attitude and the industry is ready to oblige. . . . ¶The FPC refuses to fix time limits for gas producers' sale certificates. . . . Sinclair asked that certificates expire at end of sales contracts. . . .

DRILLING—Texas tidelands drilling takes new impetus now that a second producer has been completed in the Texas Gulf. . . . The well was completed by Standard of Texas as an offset to the discovery well completed by Stanotex last June. . . . Seven other rigs currently are drilling off Texas. . . . ¶Eleven rigs have joined the play at Huntington Beach, Calif., with six other locations staked. . . . The pool may extend into the Pacific Ocean, which is only 200 yards away. . . .



Census Bureau Begins Checking

- New government survey will make complete count of all oil and gas wells in the country
- It will cover drilling, production, gas-processing, refining, and marketing
- Census will make first detailed study of industry's operations in offshore areas

Bertram F. Linz

WASHINGTON. — The economic strength of the oil industry is being measured.

The Census Bureau has started the job of finding out just how many wells were drilled and producing last year, how much oil and gas was produced, what products were made and how they reached the ultimate consumer.

It is all part of a big census of natural resources production, manufacturing and other industry, business and trade. The bureau will ask some 35,000 operators of wells, mines and quarries, 275,000 refineries and manufacturing plants and 3,000,000 wholesale, retail and service establishments for information.

Over the next couple of years the bureau will add up the figures it gets and, in a series of reports, make available to the public detailed information on what it takes to provide the demands of more than 160,000,000 people.

For the oil and gas industry this means a count of producing and injection wells, including offshore operations; a survey of refineries and other petroleum-processing plants, including petrochemical; figures on the production of oil-field machinery and tools and the volume of oil-field contract services; the capacity and sales of bulk plants and terminals and, finally, the sales of service stations.

There are a number of interesting features of this effort to see what makes the industry tick:

... It will be the first time since 1939—two wars ago—that a count has been made of the oil and gas wells of the country.

... It will be the first survey of refinery and other operations since 1947.

... It will be the first detailed information on off-shore oil and gas operations.

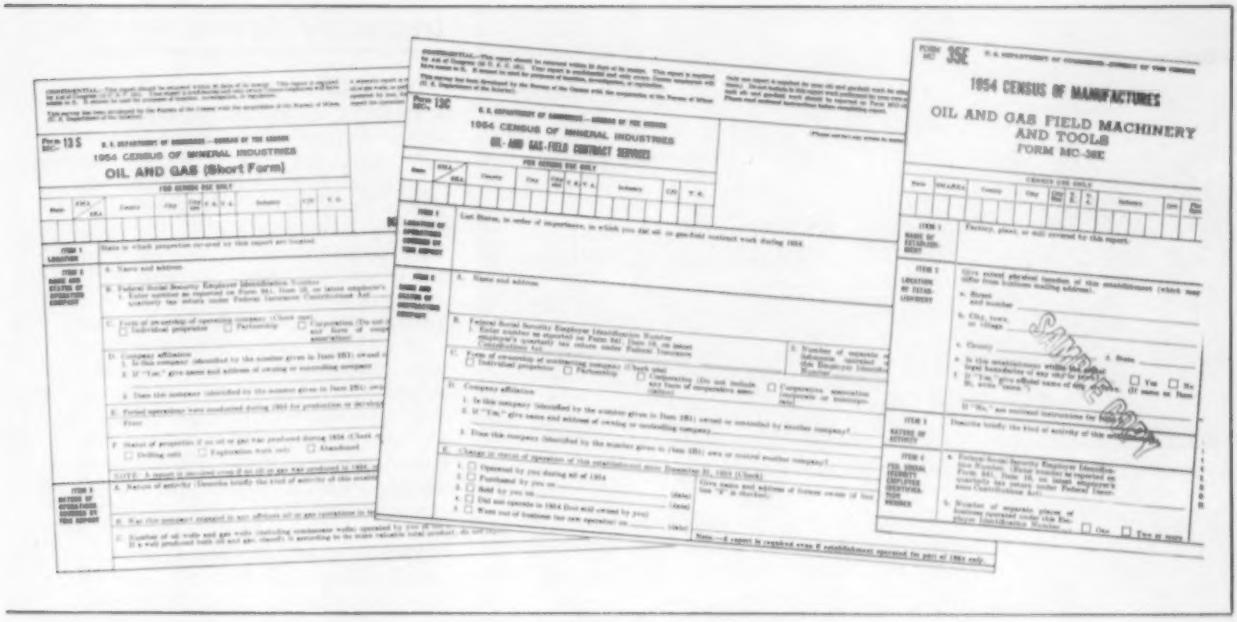
The last census of manufacturers, covering 1947, showed the industrial expansion of the war years. This one will show further expansion during the Korean emergency and since under the Government's industrial defense program.

Under the incentive of accelerated tax amortization approximately $30,000,000,000 has been invested in new plant and equipment since October 1950, with unmeasured additional billions spent on facilities which did not qualify for quick write-off or for which it was not desired. The new census will show just how much industry has grown since 1947.

Two developments of recent years are reflected in the questions which the oil and gas industry will be asked.

Because the steady drop in water supply threatens to make it the most pressing natural resources problem in the immediate future, the bureau is making the first comprehensive investigation of the industrial use of water ever undertaken. A sample survey of water consumption in 1953 is now being analyzed. The results will be published in the near future, but the current census will show more exactly how much water is consumed by each of a number of major industries and, in some instances, how much is returned to the water supply and whether it was treated before return.

The second development is related to the planning for war now going on in the Government. Questionnaires to


1954 CENSUS OF MINERAL INDUSTRIES
OIL AND GAS (Short Form)
1954 CENSUS OF MINERAL INDUSTRIES
OIL- AND GAS-FIELD CONTRACT SERVICES
1954 CENSUS OF MANUFACTURES
OIL AND GAS FIELD MACHINERY AND TOOLS
FORM MC-38E
SAMPLE

Oil's Economic Blood Pressure

equipment manufacturers will call for detailed information on the amount of primary metals and mill shapes and forms consumed and specific data on production of various items and parts of equipment. This information will be used by the Interior Department and the Office of Defense Mobilization planning materials controls and allocations in an emergency.

There have been numerous changes in ownership and operations since the last canvasses and the bureau had no complete list of establishments in the oil and gas industry. Since most operators now are covered by the social security laws or pay taxes, it went to the files of the Bureau of Mines, Oil and Gas Division, Social Security Agency and the Internal Revenue Service for information. Officials believe they now have lists close to 100 per cent complete. They will be glad to send questionnaires to any establishments that may have been overlooked.

Questionnaires tailored to the needs of each branch of the industry are now being distributed by mail. A dozen separate forms, covering as many types of activity, have been provided for oil and gas operations and about 200 for all industries.

All call for the same information regarding ownership of establishments, employment and payrolls, man-hours worked in various operations, supplies, fuels and electric energy consumed, capital expenditures, etc.

Fuel consumption is broken down to develop how much oil is used as fuel by all industries. This will serve as a check on inquiries to the oil industry for figures on distillate, residual, and gasoline, shipped to industrial consumers.

Beyond this, the questionnaires will call for more specific information on the operations of the oil industry:

. . . **Oil and gas operators** will report the number of wells producing and shut-in in December of 1953 and 1954;

CENSUS DIRECTOR R. W. BURGESS
His finger's on oil industry pulse . . .

the number of completions in 1954, dry holes, service wells and workovers; the number of wells purchased or leased and sold or leased; abandonments, wells used for service, wells in process of drilling, and wells drilled and/or producing under federal leaseholds on the public domain.

The man-hour figures will cover separately the work of operating and maintaining wells, drilling wells and building rigs, exploration other than drilling, and other activities.

The amount and value of crude oil shipped will be asked, together with the quantity of oil used in lease operations.

. . . **Natural-gas producers** will be asked about casinghead gas from oil wells and production from gas wells; amount withdrawn from underground storage or purchased, and the disposition of the gas. The latter includes deliveries to natural-gasoline plants, residue returned from natural-gasoline plants, gas used in lease operations, returned to underground formations for repressuring, pressure maintenance, cycling or storage; deliveries to distributors, transmission companies and consumers; and gas vented to air, flared or otherwise lost.

. . . **Operating information** will show, separately, the number of oil wells, gas wells, dry holes, and service wells drilled by the operator himself or for him on contract; the total footage of

CENSUS HEADQUARTERS at Suitland, Md., will tally the figures and make reports.

each, cost of drilling, cost of casing, and cost of equipment for producing. Separate figures will be asked for the number of wells drilled by rotary and cable tools.

... **Offshore operators** will be asked to show their drilling operations and production on the submerged lands.

... **A "short form"** is designed for very small oil and gas producing organizations whose manpower, equipment and water-consumption figures will not materially change the totals for the whole industry.

... **Natural gas liquid** plants will be asked for figures on the barrels of production and the quantity and value of shipments of natural gasoline, raw-cycle condensate, L.P.G., including the ethane content of chemical raw materials produced, and finished gasoline; and the long-ton production and shipments of sulfur and sulfur-bearing materials, including the sulfur estimated in the latter. They will also be asked to account for the disposition of residue gas.

While all petroleum operators will be asked to report on their water consumption, the natural gas liquid plants will be requested to give detailed information on use of water, water treatment, re-use or discharge, and the sources of fresh water intake.

... **Manufacturers of oil and gas** field machinery and tools will be asked for tonnage figures on mill shapes and forms and primary metals; the number of diesel and semi-diesel engines and gasoline and other carburetor engines used in equipment manufactured, and the value of ball and roller bearings consumed.

Detailed figures will be required on the number and value of cable and rotary drilling rigs and various items of rig equipment; rotary drilling subsurface equipment such as bits, reamers, coring equipment, etc.; well surveying and production machinery and equipment; separating, metering and treating equipment; bulk storage tanks, and pumps.

... **Operators of oil and gas** field contract services will report the dollar value of work performed for producers in 17 separate classes of service, and the amount of nitroglycerine made and consumed in shooting wells.

... **Refiners** will report the quantity and delivered cost of crude oil consumed, with domestic oil shown separately; consumption of cycle condensate, natural gasoline, benzol, antioxidants, inhibitors, L.P.G. from natural gasoline plants, additives, oil for re-refining, caustic soda, sulfur, sulfuric acid, and hydrofluoric acid.

They will be required to show the amount and value of every product they make, 40 of which are listed on the questionnaire. Included are details of shipments direct to consumers and retailers, and bulk storage capacity at the close of 1954 for aviation gasoline, other gasoline, kerosine, distillates, residual fuel oil, and L.P.G.

... **Petroleum bulk plants** and distributing terminals will use three forms. One calls for general information as well as data on bulk storage capacity for major products at the close of the year; the number of tank-body trucks, semitrailers and trailers owned or leased, and an analysis of sales by commodity lines. Marketers operating a number of bulk plants will report on a second form the storage capacity, personnel and payrolls, tank trucks, and sales by states, and will give similar information for each individual plant on a third form.

... **Service stations and L.P.G.** dealers will report their sales and whether they have above-ground facilities for more than 3,000 gal. of L.P.G. or more than 10,000 gal. of other bulk liquid fuel.

Industry Briefs

OKLAHOMA CITY.—Stanolind Oil & Gas Co. has moved its Kansas district production office from Ellinwood to Wichita. Ken W. Bolt, division production superintendent, said that an area office would be maintained in Ellinwood. Bolt said the move was being made to consolidate district production and exploration offices for Kansas.

NEW YORK.—Shell Oil Co. has been awarded contracts totaling more than $2,000,000 for supply of piston-engine oil and jet-propulsion fuel to Pratt & Whitney Aircraft Division, United Aircraft Corp. This is the fifth consecutive year that Shell has been named exclusive supplier of piston-engine oil to Pratt & Whitney.

BREA, Calif.—A $1,000,000 expansion of Union Oil Co.'s research center here is scheduled to be completed by next fall. The program will provide four additional buildings, including a steel structure 65 ft. high for pilot plants and large-scale experiments.

TULSA.—An increase of 10 to 20 per cent in its exploration and development operations is planned this year by Sunray Oil Corp. Sunray is now sponsoring seismic work which may lead to deep exploratory drilling in Andrews and Ector counties, Texas. The company also plans to step up its drilling program in the Julesburg basin.

EVERETT, Mass.—A new Girbotol liquid-hydrocarbon purification plant has been placed in operation by Esso Standard Oil Co. at its refinery here.

NEW YORK.—Capital expenditures by Socony-Vacuum Oil Co., Inc., in the Western Hemisphere this year will equal or surpass the record of approximately $265,000,000 set in 1954, according to present plans. The company spent more than $119,000,000 for domestic exploration and development last year.

DALLAS.—Twin Oil Corp., Dallas, will merge with Drilling & Exploration Co., Inc., Midland. Stockholders of both firms recently approved the merger.

NEW YORK.—Joint exploration for uranium has been undertaken in the Colorado Plateau region and other areas of the West by The Texas Co. and New Jersey Zinc Co. The announcement indicated a separate company may be formed to mine uranium if ore is found in commercial quantities.

Stanotex hits again as . . .

. . . Rigs Bustle Off Texas

HOUSTON. — Oil operators were wading off the coast of Texas with new confidence last week after Standard Oil Co. of Texas made its third successive strike near Padre Island.

Stanotex, which made the first commercial discovery in the Texas tidelands, still has the only oil production in the area. But seven other companies are now drilling there, and several others plan to start operations in the near future.

Latest completion by Standard of Texas is its 23 State Tract 948, which flowed 268 bbl. of 40°-gravity oil daily through 12/64-in. choke. Production is from the Frio zone, perforated at 8,008-30 ft. Total depth is 8,805 ft.

The well was drilled from the same platform from which the discovery, 53 State Tract 948, was completed last June. The discovery flowed oil at the rate of 254 bbl. daily. Another well, No. 56, also drilled from the same platform, found oil but has not yet been finaled.

Crude is being transported from the field through a submerged pipeline running 1½ miles to the shore of Kleberg County. From there, it is moved to the Corpus Christi refining area, about 23 miles northwest.

Other activity . . . Stanotex plans to continue drilling from the present platform, located in water 38 ft. deep. It also is preparing to drill from a second platform 3,200 ft. northeast of present operations.

Only other production from the Texas tidelands is from a gas field discovered late in 1954 by Sun Oil Co. The field is about 10 miles southwest of the Stanotex discovery *(The Oil and Gas Journal, December 6, page 94)*.

Recently, other companies have started exploratory operations off the Texas coast, which until recently has been overshadowed by prolific strikes in the Louisiana tidelands.

Others now drilling include Magnolia Petroleum Co., Pure Oil Co., Western Natural Gas Co., Shell Oil Co., Humble Oil & Refining Co., Gulf Oil Corp., and Sun Oil Co.

In addition, Shell Oil Co. and The Texas Co. have selected locations for wells, and Phillips Petroleum Co. has applied for a drilling permit.

The proposed test by Phillips would be in Block 51, 21 miles southeast of

Galveston and 15 miles offshore from Jefferson County. Shell's well is to be a 10,000-ft. test in Block 249, 15 miles northeast of Freeport and 5 miles from the coast of Galveston County. Texaco's location is for a 10,500-ft. test in Tract 137, 6 miles southwest of High Island and 3 miles off the coast of Galveston County.

Tests now being drilled include:

. . . Magnolia Petroleum Co., 13,000-ft. test in Tract 10, 10 miles southwest of Sabine Pass and 1 mile off from Jefferson County.

. . . Pure Oil Co., 10,500-ft. test in Block 189, 12 miles southeast of Galveston and a similar distance from the coast of Galveston County.

. . . Western Natural Gas Co., 12,500-ft. test in Tract 608, 14 miles southeast of Port O'Connor and 3 miles off the coast of Matagorda Peninsula, Matagorda County.

. . . Shell Oil Co., directional test being drilled from Matagorda Peninsula into Tract 486 just offshore, 7 miles southeast of Matagorda. This is an extension test for Kain field.

. . . Humble Oil & Refining Co., 12,000-ft. test in Tract 794, 15 miles northeast of Port Aransas and 4 miles off coast of Aransas County.

. . . Gulf Oil Corp., 11,000-ft. test in Tract 889, 10 miles south of Port Aransas and 3½ miles off coast of Nueces County. This is Gulf's second test in the area and is about 3 miles northwest of its first, a dry hole.

. . . Sun Oil Co., directional test being drilled from Padre Island and to be bottomed just offshore in Tract 975, 35 miles southeast of Kingsville, Kleberg County. Location is 4,600 ft. northeast of Sun's dry-gas discovery well in Sprint field.

Drilling Firm Expands

BATON ROUGE.—Increased drilling activity in the Gulf of Mexico is planned by Offshore Co., Baton Rouge, which recently purchased the contract drilling division of Southern Production Co., Fort Worth.

Offshore, a subsidiary of Southern Production, acquired 14 drilling rigs and other equipment in the purchase, which involved about $8,000,000. Nine of the rigs are barge-mounted.

The Baton Rouge company now has one deep-water portable drilling barge operating for Humble Oil & Refining Co. off the Louisiana coast. The barge is capable of drilling in water 50 ft. deep. Two other portable drilling barges, including one designed to operate in water 100 ft. deep, are being built for Offshore Co.

Deep Pool Opened

Louisiana discovery near shallow pay hit in 1927

NEW IBERIA, La.—Cities Service Oil Co. and associates are opening a deep oil-productive reservoir off the west flank of the old Fausse Point dome, 12 miles northeast of here, in northeastern Iberia Parish.

The discovery well, 1 Granger, is more than 1½ miles southwest of nearest production on the dome.

Cities Service is completing the test in Oligocene sand, with casing-perforated interval at 9,696-9,700 ft. After cleaning and initial drill-stem tests, the well flowed at the rate of 82 bbl. of oil per day through ⅛-in. choke. Pressure increased steadily from 1,330 psi. to 1,700 psi. Gas production was at the rate of 950 cu. ft. per barrel of oil.

The well, drilled to 10,700 ft., also had promising indications of gas production in a sand at 10,048-78 ft.

Associated with Cities Service in the discovery well are Falcon Seaboard Drilling Co., George R. Wadsworth, W. E. Walker, Gordon L. Atwater, and J. S. Neilson.

Fausse Point dome was discovered in 1927. Other production is from a succession of sands ranging in depth from 600 ft. to 8,700 ft., with most of the production being from shallower sands on top of the dome. Production extends eastward across the Iberia Parish line into St. Martin Parish.

Most Readers Liked Their First Look At Our New Face

Our first . . .

The Journal took what it regards as a significant step forward last week when advertising disappeared from the front of the Big Yellow Book, and what is known to us as an "editorial" front cover appeared there for the first time. Your response was most gratifying. Comments of readers ranged from pleasant surprise and enthusiasm to a down-to-earth reminder that the cover may be important, but the quality of the interior of the book is what counts.

A few of those readers' comments appear on these two pages.

Professor wants more . . .

Today I received the Journal's January 3 issue and was pleasantly surprised to see your new front cover and to learn of the Journal's new policy concerning the cover. I particularly enjoyed reading the spotlight article on the Ellenburger and found it most informative. Let's have more of this type of article.

With best personal regards, I am

Sincerely yours,
Robert L. Whiting, Head
Petroleum Engineering Dept.
A. & M. College of Texas

Not cover, but contents . . .

Frankly, it is not the cover so much as the contents of the Journal which interest me most. The publication has earned a fine reputation from its very thorough and painstaking coverage of all phases of the oil and gas industry and this, more than anything else, is what counts.

To me the Journal, perhaps more through the perpetually identifying colors of each copy, has attained a certain, not unpleasing, trade magazine status unlike any other. In comparing your issue of January 3 with that of any earlier date this effect in the new style has been preserved and I do not find an outstanding preferential reaction from one over the other. Certainly a lead, on the front cover, to articles of really newsworthy or important significance in any issue including them—something more than mere style—would not be amiss. The worthwhile meat of any item, however, is the article itself. Thus I am led to conclude I see no really strong preference for the change from the readers' point of view.

I see no objection to advertising on the cover because, after all, that too, is reading matter of no little importance to many of your subscribers. Furthermore, the sacrifice of income to the paper, the necessary added increment of which may be important to maintaining a high grade news gathering staff, appears it may more than offset an advantage of the change. Note, too, by proportioning the cover space as in the new issue, advertising could be continued while still highlighting news references when justified.

Thus as a reader, as a sentimentalist, as an art critic, as a business man, my analysis concludes you may take your choice.

Sincerely,
George P. Bunn, Manager
Natural Gasoline Dept.
Phillips Petroleum Co.
Bartlesville, Okla.

Effective highlighting . . .

As one of the regular readers of your fine magazine, I want to congratulate you on the new cover policy which has been adopted by the Journal and which has just made its appearance with your January 3 issue.

It's a most effective cover highlighting as it does your feature story for the particular issue and also calling attention to other important articles with special reader interest. Constant improvements in both make-up of the Journal and its oil and gas industry news coverage to me is the principal reason for its continued increasing value to those engaged in every phase of the oil industry.

Sincerely yours,
C. E. Wright, President
Pennant Drilling Ltd.
Tulsa, Okla.

Definite improvement . . .

Congratulations on the new front cover of your January 3, 1955 issue. It is definitely an improvement.

With best wishes for the best year you have ever had, I am

Sincerely yours,
Hy Byrd, President
Gulf Interstate Gas Co.
Houston, Texas

Journal is progressive . . .

We like the "new look" of the January 3 issue of The Oil and Gas Journal. We feel that the elimination of advertising on the front cover of the Journal is a real step forward.

We would like to take this opportunity to acknowledge the progressive manner in which you edit and publish the Journal and keep abreast of the changing times.

We wish for you and entire staff a Happy and Prosperous New Year.

Sincerely yours,
D. A. McGee, President
Kerr-McGee Oil Industries, Inc.
Oklahoma City, Okla.

Step in right direction . . .

I have received the January 3 issue of The Oil and Gas Journal which contained the first of the new front covers. I would like to compliment you on the subject which you have chosen for the first of the new front covers.

I realize that it was a bold step to remove advertising from the front cover of The Oil and Gas Journal after it has appeared there for more than half a century, but I believe that your step in making this change is in the right direction and I have no doubt but what you will receive many favorable comments on the

We Hope You'll Like This Week's New Cover As Well

Our second editorial front cover is devoted to a very lively and controversial refining subject—why preheat the feed to a cat cracker? An outstanding catalytic cracking consultant was invited to air his views on the subject, and the article appears on page 68.

We think this and last week's cover show our industrywide coverage very effectively. One week we highlight an area which promises a goodly amount of future oil, and the next we consider how to process it.

Future covers will be devoted to other industry phases.

. . . the second

new appearance of The Oil and Gas Journal.

Very truly yours,
E. N. Zimmerman
Chicago Bridge & Iron Co.
Chicago, Ill.

Art work welcomed . . .

I want to compliment your organization on the "new look" of today's issue of The Oil and Gas Journal. I think that the substitution of art work for the usual advertising on the front cover page will be welcomed by your readers generally. I also like the idea of your calling attention to the week's feature article on the front cover.

Yours very truly,
E. R. Turner, President
Pan American Production Co.
Houston, Texas

Cover stimulates . . .

The new look on the January 3 Oil and Gas Journal is most attractive and should certainly stimulate reader interest. The advertising which previously has appeared on the front cover has itself been interesting and, while I should object to advertising on the front cover of any other magazine which I read, the petroleum industry advertising on the cover of your magazine has never bothered me.

As all of us either in the petroleum industry, related fields, or regulatory bodies affecting the petroleum industry have become so busy that we rarely find time to keep up with the industry literature we so badly need to read in these times of continued change and new development, I do believe that your new cover will stimulate us to pick up the magazine and turn to an article we find we just cannot afford to miss rather than wait for a leisure moment which never seems to occur when we can scan through the table of contents and see what we find of interest.

So, congratulations to you for this new development for the ever forward and constructive outlook of your magazine.

Kindest regards.
William J. Murray, Jr., Chairman
Railroad Commission of Texas
Austin, Texas

He approves subject . . .

CONGRATULATIONS ON YOUR NEW COVER. YOU STARTED IT OFF RIGHT BY FEATURING ELLENBURGER IN WEST TEXAS. WOULD APPRECIATE YOUR SENDING ME FIVE COPIES OF JANUARY 3, 1954, ISSUE OF THE JOURNAL. SEND ME BILL.

JAMES C. WATSON
OIL EDITOR
MIDLAND REPORTER-TELEGRAM
MIDLAND, TEXAS

Pleasantly surprised . . .

When I received the January 3, 1955, issue of The Oil and Gas Journal this morning, I was pleasantly surprised to see the new front cover. I think this is quite a step forward in your publication; in fact as much so as when the size was changed.

Trusting that the future issues will come up to the standard set by the January 3rd issue, I am

Yours very truly,
Geo. L. Streeby, Pres.
Lynn Drilling Company
Tulsa.

Research director likes it

I believe that using front cover for spotlighting important developments is excellent . . . Speaking for myself, I turn page after page, including ads, for fear of losing something worthwhile.

Sincerely yours,
Dr. Gustav Egloff
Director of Research
Universal Oil Products Co.
Des Plaines, Ill.

Commissioner does, too . . .

I am glad to see your new policy of devoting your front page to matters of reader interest to the industry instead of advertisements. I congratulate you all on this effort to spotlight important news to your readers at the cost of this loss of advertising revenue.

The current issues before the industry,

1. Defending the 27½-per-cent depletion
2. Amending the Natural Gas Act
3. Imports

are to me of great importance in the order named.

Your Journal can do much to explain these issues.

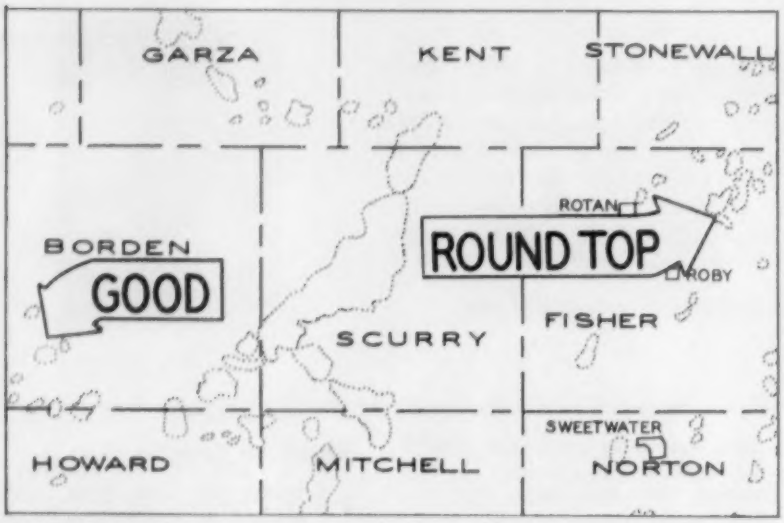
Sincerely yours,
Ernest O. Thompson
Texas Railroad Commission
Austin, Texas

Will prove useful . . .

Congratulations on the new cover of the Journal which will prove most useful to all readers.

With kindest regards and wishes to the Journal for continued success, I am,

Sincerely yours,
C. A. Warner, Vice President
Houston Oil Co. of Texas



TOP PROPERTIES in the General American-Bradley deal are in Round Top and Good fields.

Texas Properties Sold

General American swings another big deal; pays Bradley Oil more than $20 million for former Condor holdings

Robert J. Enright

DALLAS.—General American Oil Co. of Texas has made another big deal—this time with Bradley Oil Co., Dallas, for its recently acquired three-fourths interest in the former Condor Petroleum Co. oil-producing properties.

Bradley Oil, though declining to detail terms of the transaction, revealed just enough to indicate that it made a fat profit on the properties, which the company acquired last year for $19,500,000. For General American, it was one of a series of four recent big transactions.

The price to General American was "in excess of $20,000,000, plus a reserve-production override," according to Robert J. Bradley, president of Bradley Oil and of its parent firm, San Juan Exploration Co.

By virtue of the deal, General American added 183 wells currently producing about 3,600 bbl. of oil daily under restricted flow to its rapidly expanding oil holdings. The wells are located in about 10 fields in six West and West-Central Texas counties. Top properties are in Round Top field in Fisher County and Good field in Borden County *(see map)*.

Total productive acreage involved in the sale is roughly 9,000 acres. Of the 183 wells, 95 are producing from the Canyon Reef, Canyon sand, and Swastika pays in Round Top. Other wells producing from these same formations are 13 in Good field, 60 in Sayles field of Jones County, and nine in Abell fields of Pecos County. Other production includes four wells in Whieley field and one in Capps Lime field in Coleman county, and one in O'Donnell field in Lynn County.

General American also acquires 10,000 acres in nonproducing leases and royalty interest in 6,600 nonproducing acres.

The deal became official in a contract signing at the Republic National Bank in Dallas. Financing is being handled through Republic bank, New York Life Insurance Co., and Bankers Trust Co., the latter two of New York.

Present to wrap things up were Gordon Simpson, president of General American; Bradley; Rushton L. Ardrey, senior vice president of the Republic; and Donald E. Meads, assistant vice president of New York Life in Dallas.

Hectic history . . . General American's purchase of control of the lush Condor properties climaxed a weird chain of events which began last spring with a Condor sale to Bradley Oil of a 30 per cent interest in Condor. The price was $7,500,000 for 1,897 of Condor's 6,689 shares.

The heirs of Ellis A. Hall, founder of Condor who was killed in 1953 in an airplane crash in Alaska, protested and took the parties to the deal to court. The Hall heirs asked that the sale be set aside on grounds that directors of Condor who approved the deal had not submitted it to the Condor stockholders for final approval.

The case, after considerable legal maneuvering, was settled in late fall out of court. Terms of this settlement are not known, but one result was another purchase of Condor stock by Bradley. The latter firm thereby acquired another 46 per cent interest in Condor, upping its stock holding to 5,004 shares.

Condor subsequently underwent partial liquidation and 76 per cent of all its assets passed to Bradley. The remaining interest in the Condor properties still is held by Ellis Hall's heirs, who include L. J. Hall, a brother, and Richard A. Hall, a son.

Fourth big purchase . . . The Bradley deal is the fourth big production purchase made by General American in the past 6 months. The deals involved more than $55,000,000. The largest was the purchase of the producing, refining, transmission, and physical marketing facilities of Deep Rock Oil Corp., Tulsa, for about $27,000,000—$20,000,000 in cash and the remainder in 100,000 shares of General American stock *(The Oil and Gas Journal, July 19, page 64)*.

Almost simultaneously with the Deep Rock deal, General American laid another $4,000,000 plus on the line for approximately half interest of Canada Southern Oils, Ltd., in Coleman-Banff field in Central Saskatchewan. There were about 90 heavy-crude producers in the field at that time.

In August, General American bought all oil-producing properties of J. K. Hughes Oil Co., Mexia, Tex., for $3,300,000. These included 48 producing wells.

Brown & Thorp Wells Sold

McCAMEY, Tex.—McAlester Fuel Co., Magnolia, Ark., has purchased 53 producing wells on 18 West Texas leases from Brown & Thorp, McCamey, for $2,070,000. Forty-one of the wells are in Pecos County and 12 in Upton County.

Brown & Thorp properties not included in the sale are Brown & Thorp Drilling Co.; McCamey Pipeline Co., which gathers crude in the Brown & Thorp field of Pecos County; and production owned solely by C. W. Brown.

Aztec Closes Deal

Company buys big holdings from Southern Union Gas

DALLAS.—Aztec Oil & Gas Co., Dallas, has paid approximately $4,000,000 to its former parent firm, Southern Union Gas Co., Dallas, for oil and gas leases and production in New Mexico, Colorado, and Utah.

Aztec acquired an interest in 41 producing oil and gas wells and roughly 64,000 acres of leases in New Mexico, and about 46,000 acres of leases in Utah and Colorado.

Of the New Mexico properties, 21,568 acres is located in San Juan and Rio Arriba counties in the San Juan basin and 22,785 acres is in the Lea County area of the Permian basin. Aztec acquired an undivided half interest in another 19,175 acres in Rio Arriba County.

The Aztec-Southern Union deal had been in the works for some time. Southern Union granted Aztec a purchase option on the properties when it sold its interest in Aztec early last year.

Aztec started operations on its own last May 1 with 50,000 acres of producing oil and gas leases and with interests in 9 oil wells, nearly 200 gas wells, and about 70,000 acres in undeveloped leases. Initial payment to Southern Union was about $374,000.

Another payment of approximately $3,520,000 was made on completion of the transaction last week. Van Thompson, executive vice president of Aztec, said the acquisition swells company lease holdings to about 127,000 net acres in New Mexico and 46,000 net acres in Colorado and Utah. Wells which it owns or in which it has an interest include 259 gassers and 13 oil wells, all in New Mexico.

Pipeline Contracts Awarded

HOUSTON. — Two contracts have been awarded by Texas-New Mexico Pipe Line Co. for 74 miles of crude pipelines in eastern New Mexico and West Texas.

Ferguson Construction Co., Eunice, N. M., will lay 43 miles of line, most of it 8-in., and take up and relay 6½ miles of 5-in. pipe to extend crude-gathering facilities from the company's Maljamar station in Eddy County to Tulk pool in Lea County and Drickey pool in Chaves County, New Mexico.

McVean & Barlow, Inc., Odessa, was given a contract to build 24 miles of 8 and 10-in. line to move production from Roberts Ranch development area, Midland County, to Basin Pipe Line System's station at Midland, Tex.

CANADA

Pembina Expanded

Stanolind wildcat, five development wells flowing

CALGARY.—Stanolind Oil & Gas Co. highlighted activity in Pembina field last week by completing a wildcat and five development wells.

The wildcat, Stanolind et al Pembina Crown B-1, flowed 357 bbl. of oil in 24 hours on 36/64-in. choke. The well, which extends production 2 miles to the northwest, topped the Cardium sand at 5,099 ft. The well was completed at a total depth of 5,165 ft. and is located in LSD 10, 35-48-9w5. Stanolind has a half interest in nine sections near the well.

The five other Canadian wells are all development wells on nine section blocks. The wells:

. . . **Pembina Crown A-3 flowed 322 bbl.** in 24 hours on 15/64-in. choke from total depth of 5,354 ft. The Cardium was topped at 5,280 ft. A-3 is located in LSD 6, 13-14-9w5.

. . . **A-5 flowed 410 bbl.** in 24 hours on 20/64-in. choke. Top of the Cardium was at 5,244 ft. and total depth, 5,325 ft. Location is LSD 16, 14-48-9w5.

. . . **A-6 flowed 623 bbl.** in 24 hours on 42/64-in. choke from total depth of 5,328 ft. The Cardium was topped at 5,288. Loaction is LSD 4, 24-48-9w5.

. . . **F-11 flowed 290 bbl.** of oil in 24 hours on 48/64-in. choke from total depth of 5,276 ft. with the top of the Cardium at 5,205 ft. Location is LSD 12, 22-47-9w5.

. . . **F-18 flowed 421 bbl.** in 24 hours on 18/64-in. choke. Cardium was topped at 5,289 ft. and the well completed at total depth of 5,365 ft. Location is LSD 6, 32-47-9w5.

British American Hits

EDMONTON. — British American Oil Co., Ltd., has its first successful oil well in Alberta's Pembina field.

The British American well flowed 15 bbl. of oil per hour on a 10/64-in. choke, and an open flow rate tested at 40 bbl. per hour from the Cardium sand.

The firm recently acquired a half-section in the rich Pembina area.

Ontario Refinery Planned

TORONTO. — Supertest Petroleum Corp., Toronto, has announced plans to build a refinery in southern Ontario to supply its growing retail needs for petroleum products in Ontario and Quebec.

In addition to the multi-million-dollar plant, the company plans to expand into production. It has joined with three producers in a six-well drilling program in the Dunn area of Alberta, south of Edmonton.

Peace River Tests Planned

CALGARY. — Imperial Oil, Ltd., plans a $9,000,000 oil and gas exploration program in the Peace River area of British Columbia under an agreement reached recently with four other oil companies.

Drilling would be conducted over a 3-year period on land held by Pacific Petroleums, Ltd.; Canadian Atlantic Oil Co., Ltd.; Peace River Natural Gas Co., Ltd.; and Sunray Oil Co. Under terms of the general agreement, Imperial would earn an interest in oil and gas rights on about 2,500,000 acres in northeastern British Columbia.

Imperial's plans call for five deep tests and a series of shallower wells in the Peace River area.

Sunray, Canadian Atlantic, Peace River, and Pacific Petroleums recently extended their agreement with Southern Production Co. under which the latter firm will continue its exploration program in the Peace River area of British Columbia and Alberta.

Trans-Canada Gets More Time

OTTAWA. — Trans-Canada Pipe Lines, Ltd., has received a 4-month extension of its financing deadline, with April 30 now as the day for things to be buttoned up from the dollar standpoint.

During this added time, Trans-Canada must complete negotiations on both ends of the proposed 2,200-mile, $300 million natural-gas line.

On the east end, the firm must sign sales contracts with utility firms sufficient to cover the amortized cost of the line. On the other end, contracts assuring long-term supplies of gas for the utilities must be signed with gas producers.

Negotiations for the latter arrangements have bogged down since it has not been determined who will build a $20 million gathering system for gas that will go into the Alberta Gas Trunk Line, the line that will feed gas into Trans-Canada's system *(The Oil and Gas Journal, December 20, page 65)*. However, a decision on the gathering system is expected soon.

Gas Fight Warms Up

FPC hearings this week could solve some legal problems involved in natural-gas regulation, but it's doubtful

Henry D. Ralph

TULSA.—Litigation over federal regulation of natural gas will get into high gear this week and will increase in tempo and complexity as the winter wears on.

Virtually nothing of importance was settled by the Federal Power Commission's new order—No. 174-B—prescribing regulations for independent producers *(The Oil and Gas Journal, December 27, page 104)*.

Not only did that order fail to spell out what producers or what activities are subject to FPC regulation, but it deliberately invited litigation by producers who want to find out what it means. Rather than making broad clarifications, the majority of the commissioners said they preferred to decide questions case by case as they come up.

This was a way of saying "Sue us," and the industry is preparing to oblige.

Cases on tap . . . Three important cases come before the FPC itself this current week, and they may all end up in the courts if the commission's decisions don't suit the operators involved. A handful of producers have already gone directly to the federal courts in an effort to bypass FPC proceedings, and others are getting ready to do so. They have 60 days from the issuance of Order 174-B—December 17—to initiate court proceedings if they think there is anything in 174-B that is illegal or inapplicable to them—and they all think there is plenty.

On January 10 the FPC hears the Deep South case involving casinghead-gas contracts, and also the Skelly case involving escape clauses.

On January 11 the commission hears general arguments on the proper basis for fixing rates and charges of wellhead sales of natural gas by independent producers (Docket No. R-142).

The Deep South case probably will be the first one decided, and it may be pleasing to most producers. But the others most likely will simply add to the confusion.

Deep South case . . . Deep South Oil Co. contends its wellhead sales of casinghead gas are not "sales in interstate commerce for resale" and hence not subject to the act. It sells wet gas —not suitable for pipeline transmission —to the operator of a natural-gasoline plant which processes the gas, commingles it with other gas, markets the liquid products, and sells the residue to an interstate gas line.

During preliminary hearings last month, consolidated with similar cases brought by Shell Oil Co. and Humble Oil & Refining Co., the FPC staff appeared to be sympathetic to the argument that standard casinghead-gas contracts are not subject to regulation. If the ruling goes for Deep South, a great many independent producers will be out from under FPC. If the decision goes the other way, a prompt appeal to the courts can be expected.

Skelly case . . . The Skelly case coming up next week is a lulu, though possibly of little general application immediately. Here Skelly Oil Co. simply quit selling gas to an interstate pipeline in defiance of the FPC order. Skelly's contract contained an escape clause permitting it to stop service if the FPC attempted to assert jurisdiction. As soon as the FPC order came out, Skelly quit. Now FPC has haled Skelly before it to show cause why it should not be held in violation of the act and subject to heavy penalties.

Escape clauses are a prime issue. A great many producers have them, and relied on them to get out from under federal control. But the FPC orders ostensibly nullify escape clauses, and Skelly is the first company to force a show-down. But Skelly's contract is not typical. Most escape clauses do not take effect until a reduction in the contract price has been ordered and upheld by a court of last resort. However, the Skelly case will be an indication of what may happen to other types of escape clauses.

Basic yardstick . . . The basic question of what yardstick to use in fixing wellhead prices for natural gas will be thrown open for general discussion before FPC in the January 11 hearing on Docket R-142. This question isn't touched in Order 174-B. Until now the commission has been concerned with getting producers to file applications for certificates and their contract rates.

But when increased rates are asked by producers—or lower rates are asked by purchasers—FPC will have to decide what is a "reasonable" field price. This is really the milk in the coconut of federal regulation.

What is reasonable? . . . But the commission isn't apt to get much help at the hearing this week. A great many producers—quite likely the bulk of them—probably will take the position that it is impossible to evolve any formula which will show whether a wellhead price is reasonable or not.

For one thing, any suggestion that a satisfactory yardstick could be devised would be in the nature of "giving aid and comfort to the enemy." The industry is basing its case for congressional revision of the law on the contention that regulation of production is completely unworkable. Any hint that any sort of a formula might be acceptable would weaken this case.

In spite of this, a hatful of suggestions for fixing field prices may be thrown into the commission's hopper.

Formulae . . . Of course there will be the old insistence that wellhead prices can be fitted into the standard public-utility formula—fix rates to yield 6 per cent on the present depreciated value of the investment used to perform the service.

But the FPC has frequently expressed the view that this won't work. It put itself on record in the Panhandle Eastern rate case last April when it rejected the cost method as applied to gas produced by Panhandle itself and valued the gas at the "average prevailing field price" in areas where the company was both producing and purchasing. Some of Panhandle's consumers immediately took the FPC to court in a case, still pending, which seeks to force use of the utility-cost formula in setting all field prices. Since FPC must defend its position in court in the Panhandle case it is not likely to take a different stand at this week's hearing.

A circular process . . . But the Panhandle "field price" formula won't work in fields where there is only one purchaser or only one producer. Nor would it work long in any case. For if the price of gas at each well is to be fixed on the basis of the price at the adjacent well, the regulatory process soon gets to going around in circles without any fixed standard of comparison or basis for determining reasonableness.

Another group of suggestions is expected to revolve around the idea that

field prices can be tied in with the energy content of the gas or with current prices for competitive fuels. Such formulas are apt to get so complicated that they fall of their own weight.

The chief value—to the industry—of the many rate-base formulas anticipated probably will be to serve as targets for producers to shoot at. They will be able to be specific instead of talking in generalities. They can pick each formula to pieces and thereby demonstrate their contention that it's impossible for Congress, the commission, or the courts to find a formula that will tell what is a reasonable rate of return on such a speculative and hazardous enterprise as wildcatting.

Dozens of other questions about the application of Order 174-B will be raised by individual producers, either before the FPC or directly with the federal courts.

Those already docketed—none has yet been heard on its merits though a few temporary stay orders have been issued—generally seek to get wellhead sales of gas out from under FPC jurisdiction completely. A favorite allegation is that Order 174-B is illegal because it is so vague and uncertain that it is impossible to tell what operators and what operations are subject to it—or if the order is construed as applying to wellhead sales then it is beyond the scope of the law as interpreted by the Supreme Court in the Phillips decision.

Gas-Import Plan Opposed

WASHINGTON.—Plans of the Northern Natural Gas Co. to bring Canadian gas into the northern plains states ran into stiff opposition before the Federal Power Commission last week.

Existing customers of the company objected strongly to the $65,000,000 project. Their principal objections are that the price of Canadian gas is too high, the company has secured no firm contract from Trans-Canada Pipe Lines, Ltd., and that Northern isn't using its present facilities to full capacity to move gas from the Permian basin in Texas.

Justin Wolf, attorney for Northern Natural, however, told the commission the company has signed a 25-year contract for gas, with service to begin next fall. Deliveries during the first year are scheduled to hit 100,000 M.c.f. daily. The company, Wolf said, has applications for service from a number of areas other than those to which it is intended to serve.

The protestants claimed the company could meet all needs of present customers from its own reserves.

WATCHING WASHINGTON

Bertram F. Linz

Alabama in Tidelands Fight

Alabama may be added to the list of Gulf states whose boundary claims might have to be settled by the Supreme Court to determine where the federally owned outer Continental Shelf begins.

The Government has tentatively recognized Texas' right to land up to 3 leagues from its boundaries. However, it is presently involved with Louisiana over a similar claim. Alabama joined the pair last month when it offered to sell leases as far out as 9 miles.

At the Department of Justice, Assistant Attorney General Perry W. Morton, head of the lands division, pointed out that Alabama unsuccessfully sought in 1953 to file a complaint in the Supreme Court to have the Submerged Lands Act declared unconstitutional.

At that time Alabama sought to enjoin Texas, Louisiana, Florida, and California from asserting jurisdiction over any offshore lands and resources, which would have nullified the legislation restoring the historic boundaries of the coastal states. The court rejected the appeal, in which Rhode Island joined, and sustained the power of Congress to dispose of federal property.

So far, neither the states nor the Department of Justice has made any overt move to get the boundary question into the courts. But it is only a matter of time before a suit is filed, with the department probably taking the first step.

Labor Looks to States

Watch the state legislatures this year for a drive by organized labor against "right to work" laws which prohibit compulsory unionization. Seventeen states already have such statutes and others are scheduled to consider them.

Although revision of the Taft-Hartley Act will come up for consideration in Congress this session, organized labor has little hope of securing any amendment which would take from the states their present authority to outlaw compulsory membership in unions.

So far as the oil industry is concerned, the situation is of importance to only one or two branches. Refineries are almost entirely organized and there is no disposition on the part of refiners to change their relationship with labor.

The two major developments which the oil industry will follow will be an increase of 15 cents an hour or more in the minimum wage and a move in the state legislatures for increases in unemployment and workmen's compensation allowances, although A. F. of L. and C.I.O. leaders are planning an eventual effort to have unemployment compensation payments fixed by federal rather than state law.

Short Likes Long Line

Congress may be asked to overrule the reluctance of government agencies to indorse the proposed Texas-to-California crude pipeline.

Outgoing House armed services committee chairman Dewey Short of Missouri has become interested in the project and is threatening an investigation. He already has discussed the matter with defense and mobilization officials, pointing out the possibility that in another war the West Coast might find itself cut off from outside oil supplies as did the East Coast in 1942.

Neither the Defense Department, the Oil and Gas Division, nor the Office of Defense Mobilization has yet approved any specific West Coast pipeline project laid before it. The Texas-to-California line is proposed by West Coast Pipe Line Co.

There appear to be two major reasons for the position taken by the government agencies:

...One is that attention should first be concentrated on getting an additional transportation facility to the East Coast. The West Coast is definitely considered by the military to be in a less dangerous situation.

...The other is that the West Coast project calls for government guarantees officials feel they cannot give. The West Coast Pipe Line's proposal calls for a guaranteed movement of not less than 75,000 bbl. daily.

The question of both the West Coast line and additional facilities for transportation to the East Coast is expected to come up before the National Security Council within a month.

tomers by spending $1,000,000 for additional compressor facilities in the Permian basin.

New Gas-Sales Policy Set

WASHINGTON. — Fixed-term certificates for producers' sales of natural gas will not be issued by the Federal Power Commission.

The commission made this clear recently in granting Sinclair Oil & Gas Co. 45 certificates, but denied the company authority to terminate the sales involved at expiration of the contracts.

The company asked that the certificates be limited to the term of the contracts and that the commission "provide for expiration thereof simultaneously with the expiration of said gas-sales contract."

Abandonment of service, the commission held, may be authorized only when there has been due hearing upon a request and evidence presented under section 7(b) of the Natural Gas Act "that the available supply of natural gas is depleted to the extent that the continuance of service is unwarranted."

Tanker Decision Due Soon

WASHINGTON.—The Defense Department is expected to decide before the end of the month whether the Military Sea Transportation Service will continue tankering crude oil for the Navy.

The department's decision will go to the House merchant marine committee, which made an investigation of the MSTS last year and is expected to do so again this session. The committee reported last summer that its study showed the Navy could handle its oil transportation more economically by contracts with private-tanker operators.

The past Congress passed a build-and-lease law under which the Navy is to build four supertankers and make 10-year charters of 15 which are to be built by private companies.

Resources Committee Split

WASHINGTON.—Sharp differences of opinion among members of the President's Cabinet Committee on Energy Supplies and Resources Policy are blocking adoption of a report which can be submitted to the White House.

Present indications are that the report, originally scheduled December 1, will not be completed before the end of the month.

The committee is split on a number of recommendations made by the task force for which J. Ed Warren, former head of the Petroleum Administration for Defense, was responsible for the oil study. The task force reportedly recommended restricting oil imports, legislation freeing natural-gas producers from federal regulation, and a number of other suggestions for the development of a fuels policy.

Antitrust Pattern Sought

WASHINGTON. — Department of Justice officials hope the Eastman Kodak Co. case will become the pattern for the handling of antitrust suits against the oil and other industries.

In the Eastman case, the department advised company officials that it was prepared to file charges in the courts and extended an invitation to come in and talk it over. Company attorneys accepted the invitation, and after some 5 months of negotiations a consent decree was filed with the court last month simultaneously with the formal complaint.

Settlements before a case is even filed save both the Government and the defendants time and money, and also save defendants from the undesirable publicity which follows the filing of antitrust charges.

Technical Data Restricted

WASHINGTON. — Tighter security controls on the export of technical data pertaining to oil equipment will be put into effect January 15 by the Bureau of Foreign Commerce.

Under the new regulations, a license will be required for the export to any country other than Canada of technical data relating to petroleum-blending agents, refining equipment, oil-production equipment, and specially fabricated parts, rotary-drilling rigs, and well-logging instruments and equipment.

Two other types of export licenses also will be issued by the bureau. One will cover export or release to all destinations of unclassified data generally available in published form. The second will permit the export of unclassified data not published or not generally available in published form to any destination except the Communist countries.

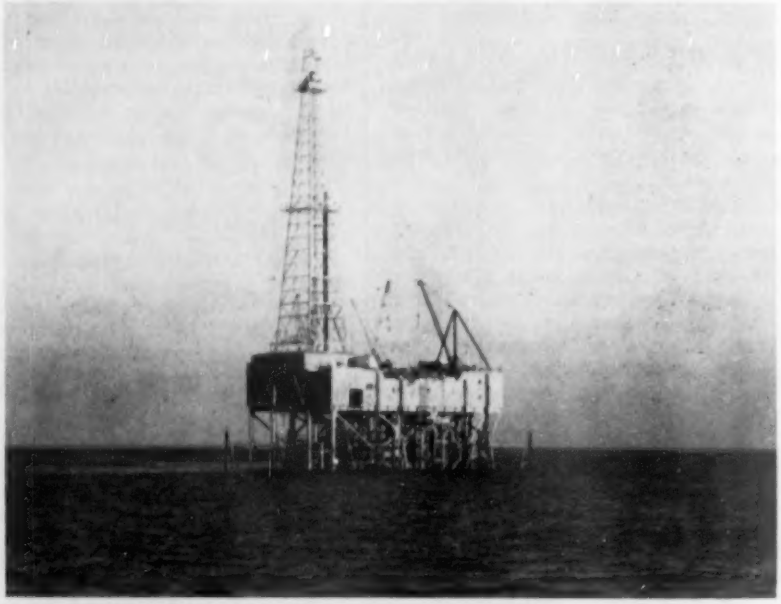
GR-S Sale Up to Congress

WASHINGTON.—Congress will be asked to pass special legislation giving the Rubber Producing Facilities Commission more time to sell the GR-S plant operated by General Tire & Rubber Co. at Baytown, Tex.

Rep. Albert Thomas, whose district the plant is in, will make the effort to keep the plant from being closed down and placed on a standby basis.

The plant, which has a capacity of 44,000 tons a year, is the only usable GR-S facility for which the commission has not received what it considers a fair price.

The sales' agreements are subject to congressional approval, and the bid made by General for the plant is considered so low that the commission doesn't feel like presenting it.



Kermac Mobile Platform Drilling First Well

Launched last September, the newest submersible drilling platform operated by Kerr-McGee Oil Industries, Inc., is drilling its initial well for Shell Oil Co. off Cameron Parish, Louisiana. The platform, the sixth rig operating in the Gulf for Kerr-McGee, is a self-contained unit designed to operate in 40 ft. of water and drill up to 18,000 ft.

Bell Answers Critics

American Telephone & Telegraph replies to resolutions condemning invasion of industry's radio frequency bands

Robert G. Deering

TULSA.—The long-simmering lease-maintenance argument between petroleum-industry communication leaders and Bell Telephone is waxing hot again.

In the latest development, American Telephone & Telegraph Co., speaking for all the Bell companies, issued a short, sharp rebuttal to recent resolutions of communication committees of both the American Gas Association and the American Petroleum Institute.

Resolutions were adopted at the fall meetings of A.G.A. and A.P.I. expressing vigorous opposition to "leasing of radio . . . equipment and services provided by . . . common carriers on frequencies assigned by the Federal Communication Commission to the Petroleum Radio Service."

What industry fears . . . Using similar language, both resolutions charge that the Bell companies are making determined efforts to invade the frequency bands set aside for the petroleum industry—and with more than an eye to present business. Industry leaders fear that if common carrier facilities, operating on petroleum frequencies, become widespread, Bell could use it as a lever against continued private frequency allocations.

This could be a strong inducement to the F.C.C. to rule that petroleum bands are unnecessary as such. The final result, should the "reserved" tag be removed, is that the carriers could move in and rapidly load the bands down with services outside the petroleum industry. This would force new users in the petroleum industry into the common carrier fold.

Bell's viewpoint . . . The Bell companies refuse to accept the dog-in-the-manger role. The statement flatly denies any attempt to grab industry frequencies. "The provision of . . . assistance," it says, "does in no way jeopardize the allocation of frequencies for private system users. Instead, it strengthens the present allocation . . . rather than weakening it as has been claimed . . ."

According to Bell, the availability of lease-maintenance arrangements have made it possible for some industry companies to use mobile radio who might otherwise have been deterred by problems of capital, obsolescence, or maintenance. Thus the lease service encourages much wider use of the allocated frequencies than would otherwise be possible.

Bell points with pride to its skills in engineering, installation, and maintenance. "It is natural," it says, "that private licensees should want to benefit from these resources and in the public interest that they be able to . . ."

Overcrowded bands . . . One basic problem involved, other than the long-range economic feature, is the dire shortage of frequencies. The petroleum industry is only one of a great number of users of mobile radio. The Vhf. spectrum is now split to serve national, state, and local governments, common carriers, commercial radio and television, forestry, aircraft, etc.—all clamoring for more frequencies.

Mobile radio operations are seriously hampered in some areas due to overcrowding. They have recently been relieved somewhat by adoption of split-channel operation, i.e., a reduction in channel width from 40 to 20 kilocycles. Thus the threat of the petroleum bands being opened to common-carrier operations naturally looms as a specter to all who are concerned with crowding in another base station. Particularly is this so in the Gulf Coast area where the future may see channel sharing as the only means of serving all entitled parties.

Industry communication engineers have nothing against common-carrier service as such. Most are quick to agree that some situations call for such service from an economical view. However, they don't want that service offered on a petroleum frequency. They want the carrier to use one of its own frequencies.

Control and maintenance . . . Control over communications is another big factor in the industry's argument against Bell. No one questions Bell's ability in research and engineering. Remarkable achievements have been made in nationwide telephone, television, and radio services—largely through Bell's efforts. The question of emergency repairs is another matter to industry engineers.

In an industry where communications are vital to proper operation, communication engineers feel absolute control is necessary over maintenance crews. In a lease arrangements they have no direct control over trouble-shooters. Maintenance men work for the carrier and not the leasee. Industry communication men fear that during widespread emergencies lease facilities would not have first priority for repair. Instead, crews would be repairing facilities which have greater earning power.

Bell strongly denies that this could happen. Bell says contractural arrangements between licensee and supplier give the former full protection.

Golf-course salesman . . . A major industry complaint against Bell in this controversy has been its business tactics. Engineers claim that top management is being sold on common carriers by the golf-course or club-room approach rather than over a sheaf of cost figures. The big pitch has been that communications is of secondary importance to the business of producing and transporting oil and gas. This, plus Bell's recognized excellence in communications, has been a convincing argument to some managements. Others, particularly those with large and well-established communications departments, are taking a much closer look at costs and intangible considerations.

Watson Refinery to Close

SAN FRANCISCO. — Tide Water Associated Oil Co. will close its outmoded 14,000-bbl. refinery at Watson in the Los Angeles area and do its West Coast refining from the 100,000-bbl. plant at Avon in the Suisun Bay area near here.

The company made the announcement at the same time it released plans for a $127 million expansion of its marketing and refining facilities this year.

Watson refinery is considered too small and uneconomical to invest money in the catalytic cracking and reforming units which would be needed. The tank farm at Watson will be kept in operation for a storage and shipping terminal.

Tide Water is presently finishing an expansion program at Avon which includes a 10,000-bbl. Hydrobon-Platformer. The two-phase operation first removes more than 90 per cent of the sulfur content from naphthas and then refines the naphtha into a high octane Platformate.

Refiners can save money with . . .

. . . Shell's New Extraction Unit

NEW YORK. — Shell Development Co. has perfected an extraction apparatus that is cheaper to build and more economical to operate than conventional equipment.

The success attained with six commercial units shows refiners can save money by using the Shell development rather than such extraction tools as packed towers, towers with contact trays, and mixer-settled systems. Shell calls the new apparatus the rotating disk contactor or RDC.

It has been most successfully applied to the extraction of lubricating oil fractions. It also has possibilities in caustic or solutizer treatment of light distillates, extraction of aromatics, deasphalting, separation of chemical and pharmaceutical-liquid organics, treatment of plant effluents, and as a staged chemical reactor.

Five of the six commercial units are operated by Shell at Shell Haven, England; Pernis, Holland (two units); Buenos Aires; and Houston. The sixth unit is operating at the Salzberger Refinery, A. G., Wintershall, Germany.

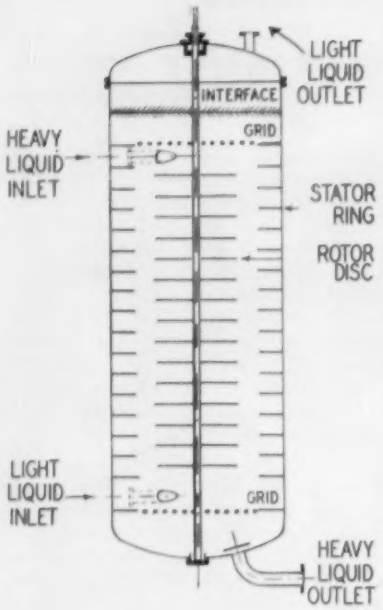
The contactor is a cylindrical tower that has been built in sizes ranging from a laboratory unit only 2 in. in diameter to commercial units more than 7 ft. in diameter. Inside the tower is a vertical rotor shaft bearing a series of flat, smooth disks (see diagram). The diameter of the disks are about half that of the cylinders. A gentle but effective agitation is attained when the shaft rotates and liquids pass through the unit.

Stator rings are fixed to the inside walls of the tower between the disks. The inside diameters of the rings are greater than the diameters of the disks, permitting easy removal of the shaft. The stator rings form compartments that effect the flow of the liquids through the tower.

Dispersion of liquids going into the unit is controlled by gravity and changing the speed of the shaft.

From its successful commercial operation of the process for extracting lube-oil fractions with furfural, Shell has found that the required solvent ratios for the RDC are lower than for packed columns.

Shell said one RDC unit 6 ft. 6 in. in diameter and 24 ft. high that has replaced a 14-stage mixer-settled system in the furfural-lube oil service. Cost of the RDC was half that of the mixer-settler. Hold-up of valuable solvent in the RDC is only 10 per cent of the former system, and mechanical solvent losses have been reduced 30 per cent.



Another unit doing the same job as a 100-ft. packed column cost less than 40 per cent as much as the packed column. Shell also has achieved more economical performances from the RDC in commercial extraction of chlorinated hydrocarbons and in purification of synthetic-detergent solutions.

Octane Record Set

Esso, Humble introduce new premium motor fuel

NEW YORK.—Octane rating of premium gasoline has reached a new high in motor fuel now marketed by Esso Standard Oil Co. and Humble Oil & Refining Co.

Although the companies did not reveal the octane number of the new Esso Extra gasoline, it is understood the fuel is leaving refineries with a 98 research octane rating. Preliminary engine tests on random samples taken at eastern service stations confirm this belief.

The new gasoline is recommended specifically for high-performance 1955 automobiles now rolling off the assembly lines. Esso Standard announced last week that the fuel is the highest-octane gasoline ever marketed for use in automobiles. It sells at the same price as the premium gasoline already on the market.

Marketing of the new gasoline followed extensive road tests conducted in Texas.

The latest jump in octane rating created a flurry of excitement in refining circles. With other companies planning to meet the increase, a new sprint is expected in the octane race.

The trend exemplified in the new development lends further credence to the possibility of a 100-octane premium fuel within the next few years.

Course to Repeat

Odessa College sets second drilling—technology class

ODESSA, Tex.—The Permian Basin School of Drilling Technology will hold its second 6-week session at Odessa College here beginning February 11.

Success of the first course last fall moved sponsors of the school to favor making it a continuing enterprise.

The school is sponsored by the American Association of Oilwell Drilling Contractors, the Petroleum Extension Service of the University of Texas, and Odessa College for persons already actively employed in the drilling business.

Subjects covered during the first session included management and supervision, basic science and mathematics, the drilling string assembly, drilling practices, prime movers and drawworks, auxiliary systems, mud pumps and mud control, well-control equipment, casing and cementing procedures, and testing and well completions.

There are expected to be a few small changes in the curriculum for the course beginning in February. One of the few criticisms of the course by graduates of the fall session was that too much time was devoted to theory and too little to actual drilling procedure and technique. This was voiced by only a few, however. Most participants expressed satisfaction with the course.

Though 33 persons completed the course, 69 attended various portions of it. They included: 2 roughnecks, 6 drillers, 22 tool pushers, 4 drilling superintendents, 3 mechanics, 14 engineers, 12 from staff and line management, and 6 in a miscellaneous category.

Spanish Line Plans Ready

WASHINGTON. — Preliminary plans and specifications for the 485-mile P.O.L. pipeline for U.S. military bases in Spain will be available for distribution January 24 in the Madrid offices of the prime contractor, Brown-Raymond-Walsh.

The company plans at present to receive bids on the performance of the work on March 23. Bidders will be asked to submit a certified check or bank draft for $150,000 with their bids. Bidders must also submit a performance guarantee over the name of an acceptable Spanish bank for 50 million pesetas ($1,175,000).

Requests for additional information should be addressed to Brown - Raymond-Wash, Edificio Espana, Madrid.

Great Lakes Job Awarded

KANSAS CITY, Mo.—Great Lakes Pipe Line Co. has set its sights on an early spring completion of its 163-mile, 10-in. products line between El Dorado, Kans., and here.

The company last week awarded a 90.7-mile spread between El Dorado and Burlingame, Kans., to Ray L. Smith & Son, Inc., El Dorado, and the remaining 72.5 miles into Kansas City to M-R Co., of Wichita.

Both companies have river crossings on their spreads. Smith has to cross both the Cottonwood and Neosho rivers near Emporia, Kans., and M-R has to go under the Kaw River west of Lawrence, Kans.

H. C. Price Co., of Bartlesville, Okla., has the contracting for stringing the pipe and for applying the Somastic coating. The line will supplement present Great Lake facilities for moving refinery products from El Dorado and nearby locations.

Pipeline Expansion Set

HOUSTON.—A $3,500,000 expansion by Texas Gas Corp. of its Gulf Coast facilities will indirectly provide New York City and other eastern centers with more natural gas.

Texas Gas received Federal Power Commission approval last week for a 12-in. line from its facilities in Orange County, Texas, to a new line of Transcontinental Gas Pipe Line Corp. in Cameron Parish, Louisiana. The project will entail crossing the Sabine River into Louisiana, building a compressor station, and a measurement station.

Texas Gas also announced that it will begin construction shortly on a Platformer at its Winnie, Tex., natural-gasoline plant. The reforming unit will produce a higher octane fuel which can be sold more readily to refineries for blending.

Oil Union Signs Contracts

CASPER, Wyo.—Central States Petroleum Union, local 124, has announced the signing of 2-year contracts covering operating, maintenance, and clerical employes at the Standard Oil Co. (Ind.) refinery here.

Although details of the agreements were not disclosed, a union official termed them "an improvement" over previous contracts.

The signing climaxed 11 months of negotiations. The union spokesman said agreement was reached several months ago on everything except pay rates. Contracts provide for continued negotiations on the wage issue.

The C.S.P.U., representing approximately 32,000 employes of Standard Oil Co. (Ind.), is the chief target of the drive by the C.I.O. Oil Workers International Union to unite oil workers under one banner. The Casper local, however, voted last year against merging with O.W.I.U.

Rigs Flock to Huntington Beach

LOS ANGELES.—Eleven wells were being drilled on the southeastern edge of Huntington Beach, Calif., last week following the completion of two producers in the newly discovered Jones sand pool.

The two producers and an earlier well which was drilled through the fault-block pool indicate the pay horizon rises to the southwest. This has led to speculation that the pool may extend beneath the Pacific Ocean, only about 200 yards away.

First completion in the new pool, and probably California's first successful exploratory test of 1955, was J. B. Crawford et al 5 Huntington. Topping the Jones sand at 3,740 ft., the well flowed 525 bbl. of oil per day through ½-in. choke from the interval at 3,740-3,905 ft. Tubing pressure was recorded at 1,150 psi., and flow was accompanied by an estimated 2,000 M.c.f. of gas.

The second well completed, Beloil Corp. 1 Hurst, topped the sand at 3,786 ft. and was bottomed at 3,955 ft. It flowed 21°-gravity crude through open tubing at the rate of 300 bbl. per day. Although only 400 ft. northeast of Crawford 5 Huntington, the Beloil well produced little gas and had practically zero tubing pressure.

Crawford et al 4 Huntington, just east of the No. 5 well, was the first test known to have tapped the Jones sand in that area. It hit the sand about 85 ft. lower than did 5 Huntington, but continued toward its original objective *(The Oil and Gas Journal, January 3, page 66)*. Completed in the Miocene at 5,000-5,300 ft., it flowed oil at a rate of 28 bbl. per hour through 5/64-in. choke.

In addition to the 11 wells now drilling, locations have been staked for half a dozen more tests near the discovery.

Lease Sale Clouded

Question of legality dims interest in Montana lands

HELENA, Mont.—Opposing opinions on whether Montana can legally resume leasing school lands for oil and gas development are dimming interest in the State Land Board's January 18 lease auction, the first in 2 years.

State Land Commissioner Lou Bretzke reported 31 applications for leasing 17,723 acres had been withdrawn. Originally, 75 tracts totaling 37,561 acres were to go on the auction block.

The withdrawals followed conflicting statements by Atty. Gen. Arnold H. Olsen and Ingolf Birkeland, head of the Montana School Boards Association.

Olsen said that there will be "no cloud on any oil and gas lease" on school lands issued at the sale.

Birkeland said, however, that school lands should not be leased "until the rights of the state have been fully clarified by a decision of the United States Supreme Court." He added that he was "confident" his association would support him in a stand that "a full clarification of this matter is most important for the future of our children, their schools, and the State of Montana."

The auction was scheduled after the Montana Supreme Court knocked out indefinite-term leases under a 1953 law. The tribunal's action supposedly returned leasing to a 20-year basis. *(The Oil and Gas Journal, December 27, page 111).*

Suit planned . . . Possibility of delaying the lease sale by obtaining a court injunction has been mentioned in legal circles here.

Regardless of whether the January 18 sale is held, the dispute over terms of state leases apparently is headed back to court. Ralph J. Anderson, Helena attorney, said he will ask the U. S. Supreme Court to overthrow the Montana court's ruling. Anderson represents Ford Johnson, Helena, who sought earlier to force the land board to grant leases under the 1953 law.

Mineral Rights Upheld

CHEYENNE, Wyo.—Union Pacific Railroad's claim to mineral rights on land granted it as right-of-way has been upheld in U. S. District Court here.

The land in question is near Borie, 11 miles west of Cheyenne. Union Pacific recently applied for a permit to drill for oil and gas on the tract, which is near several producing wells.

Judge T. Blake Kennedy ruled that the Government did not specify it was reserving mineral rights on the tract when it was granted to the railroad. The original grants were made by Congress in 1862.

The judge pointed out that in later grants to the railroad Congress reserved mineral rights for the Government.

The Government as plaintiff contended the land was granted "solely for the purpose of building and maintaining rail lines."

U. S. Attorney John Raper, Jr., said the decision will be appealed to a higher tribunal and that the case may go to the U. S. Supreme Court.

Governor Backs Gas Imports

HELENA, Mont.—Gov. J. Hugo Aronson of Montana has urged the Federal Power Commission to approve Montana Power Co.'s request for authority to import natural gas from Alberta.

Montana Power proposes to import gas from the Pakowki Lake area for use in Montana.

"The people of western Montana want natural gas service," Aronson wrote in a letter to the FPC. "They have wanted it for many, many years. Now that the Montana Power Co. is anxious to provide this service, principally to the people of Missoula, Hamilton, and tributary areas, it is my earnest hope that this request will be granted and that your commission will act favorably on the petition."

Production Sold

Tennessee Gas buys major interest in Far West Oil

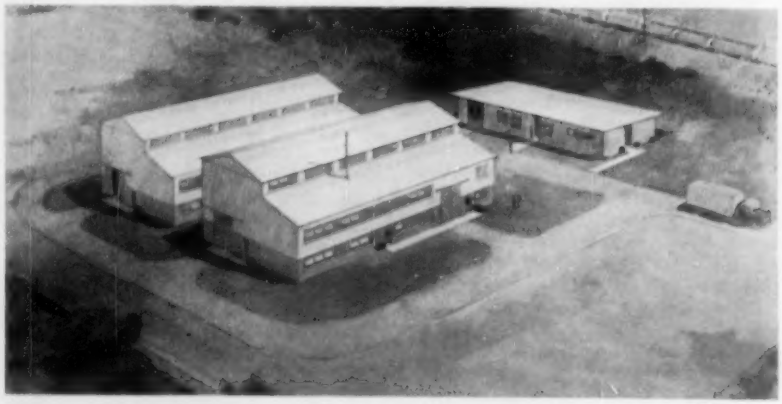
DENVER.—Tennessee Gas Transmission Co. moved into a new section of the Rocky Mountain area last week with the purchase of 83⅓ per cent of the stock of Far West Oil Co.

The price tag involved in the stock sale was not disclosed, but the amount has been estimated between $6,500,000 and $7,000,000.

Far West Oil, a San Antonio, Tex., corporation, owns and operates interests in leases on about 14,000 acres in South Glenrock field, Converse County, Wyoming. The productive area includes 131 oil wells with a production net to Far West Oil of about 1,600 bbl. of sweet crude daily. Far West operations have been carried on primarily in the Rocky Mountains under the supervision of William H. Curry, vice president, Casper, Wyo.

Tennessee Gas maintains an office in Denver and has been active in the Denver-Julesburg basin and in Weston County, Wyoming, but this transaction expands its operation materially. The purchase followed closely the approval by the Federal Power Commission of the merger of Tennessee Production Co. with the parent company.

Gardiner Symonds, president of Tennessee Gas, says an aggressive program will be continued to expand company ownership of gas and oil reserves by the purchase of new properties as well as by exploration and development. He said the Far West purchase is consistent with this program.



Research Facilities in Ohio Near Completion

Battelle Institute will expand its program of pilot-plant and large-scale research for the petroleum and other industries with completion of the first units in its new research center near Columbus, Ohio. The laboratories shown here represent an investment of about $300,000 and soon will be ready for installation of equipment.

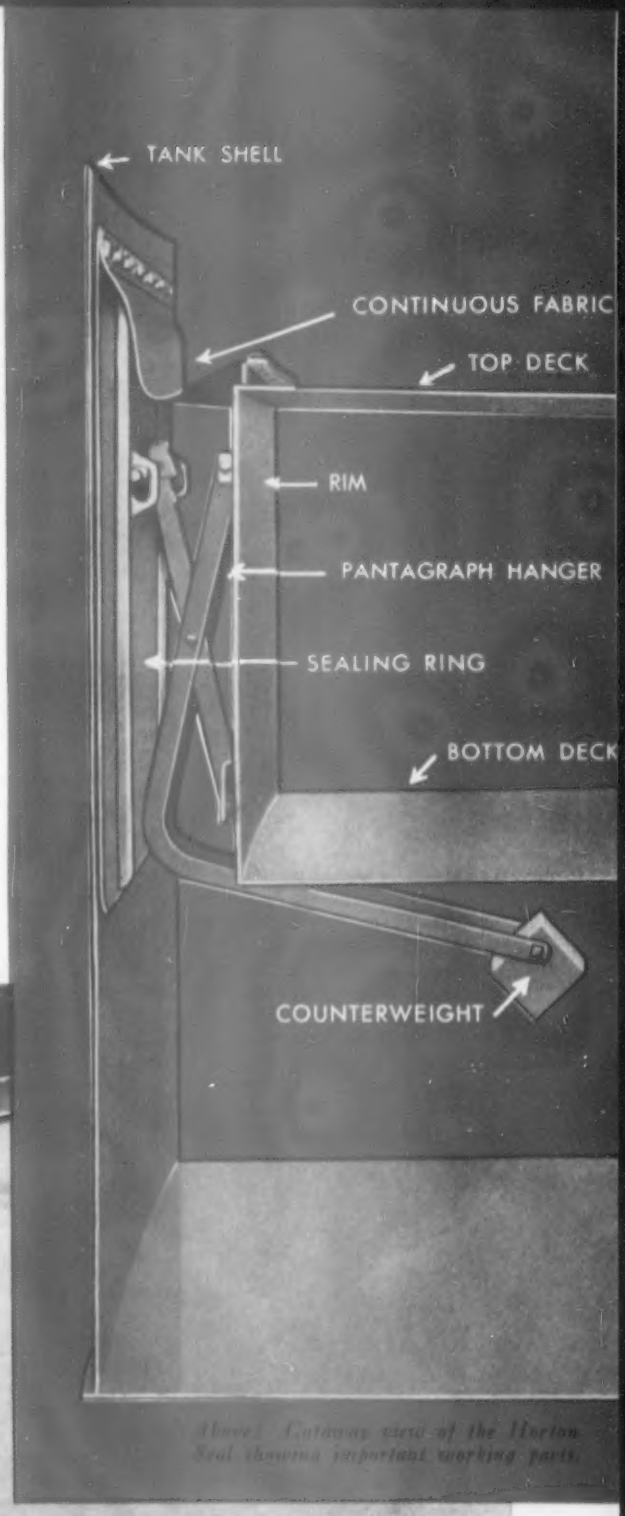
To stop evaporation in a Floating Roof Tank . . .

HORTON SEAL

The real effectiveness of a floating roof in preventing evaporation loss depends upon the seal used to close the space between the rim of the roof and the tank shell. The most efficient type built, *the Horton Seal,* is standard equipment on all Horton® Floating Roofs.

A Horton Seal has a continuous sealing ring with vertical flexures every 22 inches that allow it to conform and fit snugly to the inside of the tank shell. The sealing ring is supported by pantagraph hangers applying a gentle, uniform, outward radial pressure at each flexure that is distributed over the entire height of the sealing ring. The hangers also exert an increased pressure on the side of the roof nearest the tank shell when necessary to recenter the roof. The space between the top of the sealing ring and rim of the roof is closed by a continuous, gas-tight, flexible fabric. *No secondary seal is necessary* when your welded tank has a Horton Floating Roof.

CB&I engineers will be happy to supply further information, estimates or quotations. Write our nearest office. There is no obligation.



Above: Cutaway view of the Horton Seal showing important working parts.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3	2154 Healey Bldg.	Detroit, 26	1514 Lafayette Bldg.	Pittsburgh, 19	3228 Alcoa Bldg.
Birmingham, 1	1536 North 50th St.	Houston, 2	2119 C & I Life Bldg.	Salt Lake City, 4	525 West 17th South St.
Boston, 10	1025—201 Devonshire St.	Los Angeles, 17	1523 General Petroleum Bldg.	San Francisco, 4	1554—200 Bush St.
Chicago, 4	2128 McCormick Bldg.	New York, 6	3347—165 Broadway Bldg.	Seattle, 1	1325 Henry Bldg.
Cleveland, 15	2204 Midland Bldg.	Philadelphia, 3	1615—1700 Walnut Street Bldg.	Tulsa, 3	1606 Hunt Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N. V. 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. General Justo 275, Grupo 306, Rio de Janeiro, Brazil

Venezuelan Record Falls

Production averaged 2,000,000 bbl. daily in November to set new high; output increased to meet fuel-oil demand

HEAVY winter demand for fuel oil has pushed Venezuelan crude-oil production to a new all-time high.

During November, output averaged 2,015,391 bbl. daily. This marked the first time Venezuelan production has topped the 2,000,000 bbl. daily mark. The previous record, on a monthly basis, was the 1,935,152 bbl. daily produced in December 1953.

Industry figures show that Venezuelan production on a weekly basis reached three consecutive new records during November. Output in the week ending November 15, averaged 2,012,048 bbl. daily; 2,016,100 bbl. daily ending November 22, and 2,026,659 bbl. daily the week ending November 29.

Rigs drop . . . Rigs in service in Venezuela on exploratory and development drilling showed a drop in mid-November as compared to a month earlier. The total was 92, consisting of 49 in eastern Venezuela, 40 in western Venezuela, and 3 in the Barinas area. High among the individual companies was Mene Grande with 28, and next was Shell with 26.

Other operators and the number of rigs in operation were: Creole, 12; Texas, 11; Varco, 3; Phillips, 1; Socony-Vacuum, 5; Sinclair, 3; Richmond, 2; and Pantepec, 1.

Including rigs on service operations, the total active in Venezuela in mid-November amounted to 123 as compared to 118 in mid-October. The November figures showed 17 rigs on workovers, 4 on cleanouts, 2 repair strings, 5 service, and 3 testing.

Completions down . . . Wildcat completions in Venezuela in 1954 have exceeded the previous year, though total completions are down. During the first 9 months, 130 wildcats were completed. This exceeded wildcat completions for the entire year 1953. However, total completions of all-type wells are running behind 1953 and are expected to be 50 or more less than the 802 completions in Venezuela in 1953.

The record in well completions in Venezuela was set in 1952 with 1,215. Prior to 1951, completions were between 600 and 700 wells a year.

Drilling reports from Venezuela show that further successful completions are being made in basement rock in Mara field in the western part of the country. Shell is deepening three wells to the basement, Texas two, and Mene Grande one. Though a few of these basement wells have been dry, one flowed approximately 12,000 bbl. daily after being deepened.

Shell has undertaken a new field test, SOM-2, within the city limits of Maracaibo in western Venezuela, and Creole has resumed drilling in its Motatan field on the east side of Lake Maracaibo.

In eastern Venezuela, Creole has spudded MR-2 in Manresa field, west of Jusepin where a discovery was made last August. Mene Grande's Guacos 1 drilled to 8,557 ft. was completed as a new pool discovery. Sinclair has completed SB-148 in Santa Barbara field, and Creole has drilled three offsetting wells.

Cuban Field Grows

New prospective producer offsets Echeverria wells

CUBAN CANADIAN PETROLEUM CO. OF CUBA has a prospective oil producer south of Cuba's Echeverria field discovered last year.

The company's 2 Echeverria reportedly drilled through an oil-saturated sand at 980 to 1,160 ft. and another show at 1,510 ft. Pits were covered with oil, according to reports received from Cuba by Lowell M. Birrell, president of American Leduc Petroleums, Ltd., of Edmonton, parent firm of Cuban Canadian.

The well is in Camaguey province on a concession totaling approximately 15,000 acres offsetting the Echeverria discovery on a checkerboard pattern. The 2 Echeverria reportedly is about ¾ mile south of the discovery and less than 500 ft. from another producer recently completed by Kerr-McGee Oil Industries, Inc.

Kerr-McGee, which drilled the discovery for Cuban interests, has exercised its option to buy 25 per cent interest in the concession totaling about 15,000 acres adjoining the Cuban Canadian acreage *(The Oil and Gas Journal, October 11, page 120).* Kerr-McGee has completed four producers in the area, each with a production potential of about 100 to 150 bbl. daily, and has staked location for a fifth well.

Cuban Canadian plans to start exploratory work this year on other leases covering approximately 5,000,000 acres and scattered through five Cuban provinces.

Ship Blocks Canal

Mishap with bridge stops Suez traffic for 3 days

THE Suez Canal, the world's busiest waterway and a vital link in the shipment of Middle East oil to Europe and North America, was blocked for 3 days recently after a tanker crashed into the supports of a railroad drawbridge.

Scores of ships were lined up at both ends of the Suez as engineers of the canal company worked to clear the wreckage. The freak accident was regarded as one of the most serious in the 75-year history of the canal.

More than 60 per cent of the tonnage of vessels using the canal is accounted for by tankers. An average of around 1,200,000 bbl. of oil is carried through the canal each day in both directions. About 85 per cent of this is crude oil moving north from Persian Gulf fields.

The tanker involved in the crash was the 10,892-ton World Peace owned by the Greek operator, Stavros Niarchos. It was carrying a load of crude oil from Kuwait and was second in a convoy of nine ships moving north through the 107-mile waterway.

At one of the narrowest parts of the canal 10 miles north of Ismailia, the World Peace struck a pillar of the bridge, knocking a 350-ton section between the tanker and the shore and blocking the canal. The tanker grounded on a sandbar.

Originally, the Suez Canal Co. estimated it might be as long as 10 days before traffic could be resumed and sent out messages asking that shipping be diverted thousands of miles around Africa. Fast salvage work, however, cleared the wreckage by January 3. Fire hoses played water over the tanker while torches were used to cut up the fallen bridge span.

A 10-day shutdown in movement of crude oil through the canal would have throttled back the level of refinery throughput in many plants throughout western Europe and also forced a cutback in Persian Gulf crude production.

Sicilian Field Producing

Island's first production flowing at about 600 bbl. daily from three Ragusa wells; exploration mapped in other areas

GULF OIL CORP.'s subsidiary, American International Fuel & Petroleum Co., has begun commercial production from Sicily's first oil field, which it discovered early in 1953 at Ragusa in the southeastern part of the island.

Heavy-gravity crude (19.5-21°) is being pumped at a 500-600 bbl. daily rate from each of the three wells completed. Ragusa 4 is being drilled about 0.6 mile south of the discovery.

Tankage has been erected at the Ragusa railroad station, and the crude is being shipped by rail about 90 miles to Augusta for refining. The Augusta refinery, owned by the Italian RASIOM company (Raffinerie Siciliane Olii Minerali), is the old Danciger Oil & Refining Co. plant which was sold and shipped to Augusta in 1950. It has been considerably expanded since, and now is rated at 35,000 bbl. daily.

Gulf recently obtained its Ragusa exploitation concession from the Sicilian Government, which holds regional autonomy in petroleum and other matters. The development program for the next 3 years includes an additional 22 wells.

The field . . . Ragusa is understood to rank close to a major field discovery as now evaluated.

The recent completion of the third well in the field gave further confirmation of the existence of a thick limestone producing section. The formation is topped at around 6,200 ft. and is some 340 ft. deeper in the lower of the other two wells. The Nos. 2 and 3 wells were located 0.6 mile north and 0.3 mile south of the discovery.

The discovery rig is in opeartion near the village of Joppolo to the west of where American International Fuel & Petroleum is drilling an exploratory hole on behalf of Mediterranean Oil Co. (65 per cent owned by Gulf and 35 per cent by Macmillan Petroleum Corp.). Drill pipe stuck in this well at 8,235 ft. and another hole has been whipstocked at 6,187 ft.

More exploration . . . Further exploration concessions have been granted by the Sicilian regional government, according to recent reports from Palermo.

American International Fuel & Petroleum has obtained rights over 73,478 hectares (about 185,000 acres) in the Provinces of Siracusa and Ragusa; the Edison Co. of Milan, 23,840 hectares (57,500 acres) in the provinces of Trapani and Palermo; and the Massarenti Co. of Piacenza, 21,720 hectares (53,500 acres) in Catania and Siracusa.

Italy's production . . . From a national standpoint, the Ragusa operation will provide Italy with its only substantial crude-oil production. At present, the state company, Azienda Generali Italiana Petroli, produces about 1,500 bbl. daily from small fields in northern Italy's Po Valley.

Gas production, principally by AGIP, provides the principal hydrocarbon output of importance on the Italian mainland. Production in August was 158 million cubic meters (180 million cubic feet daily). New anticlinal structures have been located in the Venetian sector of the Po Valley where it is reported drilling will be undertaken soon.

The gas distribution organization, which like AGIP is a branch of government's over-all agency, Ente Nazionale Idrocarburi, had approximately 3,500 km. (2,170 miles) of gas lines laid up to the end of last July. Excepting two railroad crossings awaiting bridging, the line from Cortemaggiore to Genoa is virtually completed. The Cremona-Porto Marghera line is in operation, and the Imola-Forli-Cesena line is nearing completion.

Refinery Struck

Labor disputes threaten plants in India, Bahrain

A LABOR strike in one area and a proposed strike in another have threatened operations in two large refineries in the Middle and Far East.

A week's general strike aimed at political reforms occurred in Bahrain where Bahrain Petroleum Co., Ltd. (Caltex) operates one of the largest refineries in the Eastern Hemisphere. Most of the company's local labor force failed to appear for work, but no interference with oil operations was reported.

A substantial reduction in Bapco's refinery throughput would quickly be reflected in lower production in Saudi Arabia, which supplies most of the crude for the 205,000 bbl. daily capacity plant. Bapco also has a daily crude production of about 30,000 bbl. on the island.

Bahrain is governed by a local shaikh with British Government advice, particularly in foreign relations. The strikers sought changes in the use of the oil income received by Bahrain and the establishment of a commission to study reforms in public health, education, and other fields.

The other area hit by labor trouble was Bombay, where Standard-Vacuum Refining Co. of India, Ltd., put a 25,000-bbl. daily refinery into operation last summer. Burmah-Shell also has a 40,000-bbl. daily refinery under construction at Bombay.

The Petroleum Workmen's Union indefinitely suspended a proposed strike after being warned by the Bombay Government that a walkout would be illegal. The labor group said it would try to reach a settlement. The union had presented various demands to Burmah-Shell, Stanvac, Caltex, and Indo-Burmah Petroleum Co., including a demand for "proper pay scales."

Iraq Field Opened

Rumaila production started after facilities completed

ANOTHER new oil field has been brought into commercial production in the Middle East.

The field is Rumaila, situated about 20 miles west of Zubair field in southern Iraq. The discovery was made about 1 year ago by Basrah Petroleum Co., Ltd., a part of the Iraq Petroleum Co., Ltd. group.

Commercial production of the field was made possible by the completion of a gathering system, separator station, and a 14½-in., 20-mile pipeline leading east to Zubair. Two lines, one 24-in., and the other 12 and 16-in., extend from Zubair to a tanker terminal on the Shatt-el-Arab at Fao.

Rumaila has four completed wells which will be produced at about 8,000 bbl. daily. Two more are nearing completion, and a seventh is drilling at about 8,000 ft. Two rigs are running in the field.

Possible extension . . . Kuwait Oil Co., Ltd. last August spudded in a wildcat —Raudhatin—in northern Kuwait on what may turn out to be an extension of the Rumaila structure. This well was last reported still drilling.

Background . . . Rumaila produces from the same formations as Zubair. The crude is being taken from the Zubair 3 pay, a Middle Cretaceous sand found between 10,000 and 11,000 ft., about 1,000 ft. higher than in Zu-

bair. The fourth Zubair pay has been successfully tested in Rumaila.

Basrah Petroleum has a commitment with the Iraq Government to meet a production goal of 8,000,000 tons (160,000 bbl. daily) by the end of 1955. Rumaila is expected to be producing at least 60,000 bbl. daily by the end of 1955, backing up existing output from Zubair.

The pumping facilities at Rumaila allow the crude to moved directly to Fao or into tankage at Rumaila. The separator, or degassing, station, is of the usual I.P.C. type and capable of handling up to about 80,000 bbl. daily.

Five Rigs Active

Israeli depth record set as first production sought

FIVE exploratory wells are now being put down in widely scattered parts of Israel in an exploratory play aimed at finding the first production in the Eastern Mediterranean country.

Exploration was touched off by the passage in 1952 of a comprehensive petroleum law opening the country to foreign operators. Four companies are involved in the drilling effort, three of them directly backed by American and Canadian capital.

Ladidoth-Israel Petroleum Co., Ltd.'s Beeri well south of Gaza is drilling below 10,600 ft. A drill-stem test at 9,150 ft. is reported to have recovered only salt water. The well is already the deepest ever drilled along this part of the Eastern Mediterranean coast, and is expected to continue to a 12,000 ft. objective in the Triassic.

The same company's Massada well west of the Dead Sea is reported to be around 900 ft. This test earlier had slight gas shows and penetrated 10-ft. thick layer of heavy tar. Lapidoth-Israel represents Israeli and United States interests and is owned 31 per cent by American Israel Petroleum Corp. (American Palestine Trading Corp.)

Pontiac Petroleum-Israel Continental's well, Carmel 1 near Haifa was last reported drilling at 4,135 ft. A protective string of 9⅝-in. was set at about 3,600 ft.

The Tel-el-Safi test of Israel-Mediterranean Petroleum, Inc., and Pan Israel Oil Co., Inc., is at 2,169 ft. and fishing. This well also has run into trouble with cavernous formations.

The fifth test is the Rekhme 1 well of Israel-American Oil Corp. 25 miles south of Beersheba, which was recently spudded. Israel American is the outgrowth of partnership of Husky Oil Co. and Bear, Stearns & Co.

Anglo-Iranian Stock Split

A four-for-one stock split was made recently when the name of Anglo-Iranian Oil Co., Ltd., was changed to British Petroleum Co., Ltd.

In conjunction with the stock split, stockholders voted a capital adjustment plan under which $225 million will be transferred from general reserve to capital account. The split brings the British Petroleum stock total to 100,687,500 shares.

The name, Anglo-Iranian, had long been an inadequate reflection of the firm's international activities, and became even more inaccurate following the nationalization of its Iranian properties in 1951. The company operates widely throughout the Eastern Hemisphere, holds interests in Canada, and owns one of the world's largest tanker fleets.

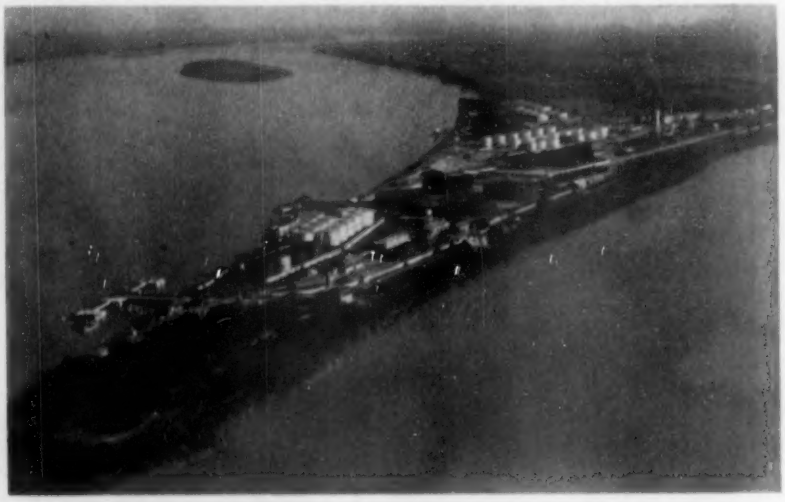
What is now British Petroleum Co. was first incorporated as Anglo-Persian Oil Co. in April 1909 to operate the original D'Arcy concession in Iran. The name was changed to Anglo-Iranian in 1935.

International Briefs

Legislation making it an offense to discharge oil into the sea in certain specified coastal zones has been introduced in the British Parliament. The bill, which applies to United Kingdom registered ships, follows recommendations made by an international convention on sea pollution earlier this year in London. The prohibited area generally is 100 miles in the North Sea and 50 miles elsewhere.

Geophysical work by the Spanish Commission de Investigaciones Petroliferas de Valdebro is scheduled in an area of Burgos Province to the east of the Lerma-Burgos road.

A plan by which present state participation in the profits of domestic-oil concessions will be replaced by royalty payments by producing companies is established in a draft decree of the French Government's advisory body, the Superior Council for Petroleum.



French Refinery Expanding

AN $8,300,000 modernization and expansion program has started at the French refinery operated by Raffineries de Petrole de la Gironde, an affiliate of the Caltex Group.

The present refinery, located at Bec d'Ambes 15 miles north of Bordeaux, was completed in 1950 at the site of a war-damaged refinery. It had an average daily crude run during 1954 of about 20,000 bbl.

New facilities will include a fluid catalytic cracking unit with a capacity of 5,150 bbl. per stream day, a 7,100-bbl. vacuum distillation unit, and a 600-bbl. catalytic polymerization unit.

In conjunction with the refinery expansion, the Caltex Bayonne, a 16,450-ton tanker, recently was transferred to the French flag for operation under Outremer de Navigation Petroliere, S.A.F.

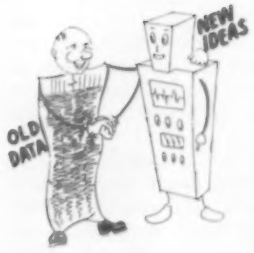
A new company in which California Texas Corp. is principal owner is being registered to aid exploration in metropolitan France. The new company is to be known as American Overseas Petroleum (France), S.A., or Amofrance.

The Road Ahead . . . As Oil Men See It

Here's the first installment of "What's Ahead in 1955" comments by the Journal's all-divisional Editorial Advisory Board. These contributions by oil and gas industry leaders are concise and significant appraisals of coming events and developments. Further installments will appear in coming January issues.

Exploration

What do wildcatting economics promise for 1955?



"Extensive wildcatting, both planned and random, is beginning to make a dent in the quantity of future discoverable oil. In the past few years large additions to the reserves inventory have been made. These, however, are the result of a large number of relatively small discoveries, many of which were along productive trends which were obvious as favorable hunting grounds. *Recent success* seems to be due to the amount of drilling and the amount of money poured into exploration, rather than to more refined methods of exploration. If this experience is a guide, then future success will depend on mass search, which even if it produces few spectacular discoveries nevertheless will result in vast quantities of new oil representing the sum of many small discoveries.

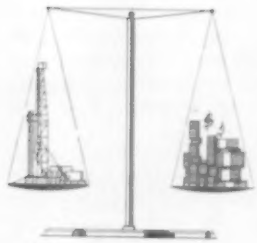
"Carrying this thought a step farther, the time may not be too far off when, unless offshore drilling produces spectacular results, fully integrated companies as a group with large fixed demands for crude oil may find it difficult to supply their requirements by their own search alone. If this is true, *then the importance of the number of wildcatters continuously at work becomes evident . . .*

How to find "difficult" new pools?

"The departments of the oil companies charged with finding new reserves have been handicapped in some basin areas with lack of knowledge of the stratigraphic sections since geophysical methods came in some years ago. *The companies should develop a custom of drilling joint stratigraphic tests in critical areas* so as to learn the sequence and character of the formations, also to get velocity tests to tie in with seismic work. In some areas, this expenditure would mean more accurate seismic interpretations and . . . would result in great savings in prospecting."

Drilling

Slim Holes? Will portable rigs increase, using smaller pipe?



"We fully expect to see the use of more lightweight, highly-portable drilling equipment in the drilling of exploratory wells, so that industry can drill more exploratory holes with the same exploratory dollars.

"The hole size will be 5⅝ to 6¼-in. so that the well can be drilled with 2⅞-in. tool-jointed tubing as the drill pipe. If production is found, an exploratory well can be completed with 4½-in. or smaller size casing.

"Also, we should expect to see more slim hole development wells during the year 1955. New perforating and logging tools have made it practical to complete wells with 2⅞, 3½, or 4½-in. oil strings."

Engineer agrees, foresees electric drives

"It is my belief that not only is it important to develop lightweight, highly-portable drilling equipment, but it is more important to study the entire problem of drilling equipment. It appears to me to be sadly in need of some real engineering, both mechanical as well as electrical, and we believe the future will not only see a 'complete package' well drilling equipment developed, but along the lines of diesel-electric drive. This will not only streamline the operations, but be the means of . . . far greater performance with much lighter equipment due to torque multiplying ability of electric drive, which is obtained in no other form of drive or converter."

"Attempt to amend the Natural Gas Act . . . will meet with considerable

Natural Gas

What about F.P.C. control of natural gas?

"We do not believe that Congress will exempt the production of natural gas from F.P.C. control during 1955. It is our opinion that F.P.C. will have to relax controls to the point that there is some freedom in the negotiation of wellhead gas prices and to permit the adjustment of wellhead gas prices under existing contracts, or the supply of natural gas will decrease.

"Field prices of natural gas should not rise appreciably under free competition with coal and fuel oil. It is our opinion that there will be no construction of additional long-distance gas transmission lines in the near future because gas producers will not commit their gas reserves unless they know the rules by which they can sell them.

"F.P.C. has said that they are going to control gas prices, but they haven't said how. The producers will wait until F.P.C. says how they will control prices.

"Think the attempt to amend the Natural Gas Act to exempt sales by producers from F.P.C. control will meet with considerable opposition from the consuming public, particularly the large cities which are involved. It is my opinion that the work heretofore done by the oil industry as an attempted public relations and educational campaign has been largely ineffective and has in fact in some instances antagonized the very people whose support it should have been seeking to win. It is my feeling that the consuming public will not be much swayed by the fact that large oil companies are not receiving as high a price for natural gas as B.t.u.-basis comparison with the price of crude oil would produce.

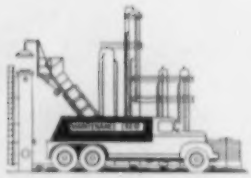
"Basis for education and public relations on this matter should, in my opinion, be aimed at the fundamental fallacy of federal regulation of a commodity not having any of the characteristics of utility service, rather than at the assertions that the field price of gas forms only a small portion of the actual final cost to the consumer and that the producer is not really getting his money's worth now anyway. The attempts to indicate what would happen to consumers' gas supplies and the unit prices of gas delivered to them in the distant future are too indirect to have any real effect at this time.

"*Field prices of gas would continue to rise,* for some period under free competition with other fuels, but would inevitably level off after the competitive fuel prices in the consuming areas had reached a point at which natural gas would be selling at a substantial premium over the other types of fuel.

"*The accumulation of gas supply contracts* as the basis for additional long distance gas transmission lines would be difficult until a clarification of the position of producers and sales of natural gas . . . either through amendment of the Natural Gas Act or statements of policy by the Federal Power Commission which will allay the concern of producers with respect to such regulation."

Refining

In refining, what is No. 1 operational problem for 1955?



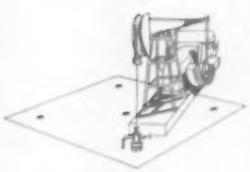
"We believe that the real big drive in 1955 will be for the reduction of maintenance costs, which have been steadily mounting in the industry over the past 5 years (they are almost double what they were 5 years ago). We believe this maintenance cost reduction can only come about by engineering study. First by investigation, in detail, of maintenance methods and leading up to a preventive maintenance program supervised by an independent agency within the corporation.

"The question of maintenance has been entirely one of 'repair' rather than maintenance, and when you repair something it is too late. By the proper study, preparation of a system for preventive maintenance and a recognition in our entire industry that much can be done in maintenance outside of the industry itself, a reduction in cost will result.

"I believe it is a very significant point that every refiner who has a shop thinks he must build something himself, make spare parts, etc., without keeping in mind that any part that fails the guarantee is on the builder (which in most cases is the refiner himself) rather than on the outside agency where he has purchased . . . at a fixed price and under a guarantee.

opposition from consuming public . . . particularly large cities".

Production



Reservoir engineers should lay the basis for wider spacing, higher allowables . . .

"During 1955 we expect the reservoir engineers to increase their efforts to obtain wider spacing and commensurate higher allowables per well in order to improve the economics of drilling and to combat shutdown days in Texas.

"Improvements in dual completion equipment and techniques should bring about an increasing number of dual completions —again, this is an effort on the part of the petroleum engineers to bring about higher allowables per well to improve the economics of deeper drilling.

"Industry will have to carry a large reserve production capacity for the next several years. However, present proration laws are not adequate to handle this problem because in most states there is little or no allowable increase for wider-spaced wells. Wider-spaced wells would tend to build up reserves with the same number of wells drilled.

"Crude production in the United States will not be increased much during 1955, probably less than 3 per cent over 1954. Additional pipeline capacity and outlets should bring about some improvements in production in the Rocky Mountain area."

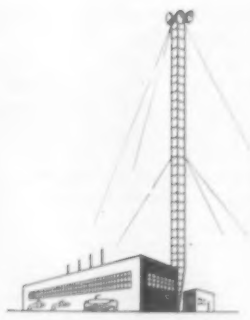
. . . more secondary recovery

"There should be an increase in secondary recovery projects started during 1955, using either or both water flood and gas injection. During 1955 we should see an increase in efforts to unitize several of the large fields, such as Magnolia, Arkansas, and Sholem Alechem in Oklahoma for secondary recovery purposes."

Operator expects sympathetic depletion treatment

"I do not believe that the depletion allowance on oil and gas will be in danger during 1955 or 1956. As a Republican, I am somewhat reluctant to say it but we are in much better shape to hold our present rate of 27½ per cent with Democratic chairmen of the committees of both the House and the Senate. In fact, we seem to have more sympathetic treatment of this business from Democratic Congresses than we do from a Republican controlled Congress."

Pipelines



Will pipelining enjoy good business in 1955?

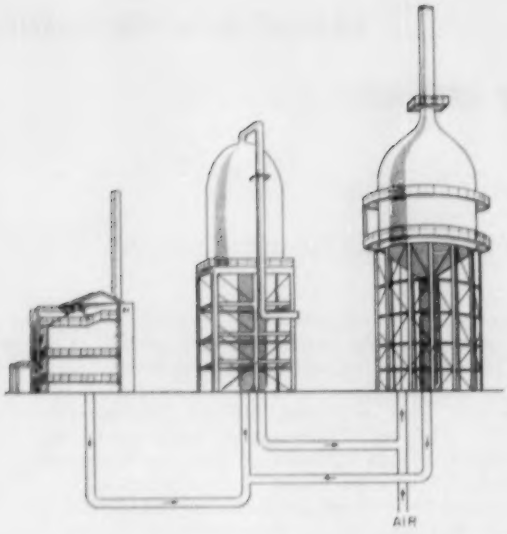
"I am of the opinion that basically we can have an optimistic outlook on our pipelining as a whole for 1955. While there may not be any great extensions to existing crude systems, apparently the gas industry will carry on a rather extensive construction program and of course products pipelining will have certain extensions made here and there to meet growing demands.

"In this day of shortened communications, major events in other industries such as steel and automobile will affect our business. It now appears that U.A.W. may cause strikes in the automobile industry which . . . could affect pipeline industry to some extent.

"I believe there will be a continued improvement such as *automatic controls* and *streamlining of systems in some of the older crude oil pipeline companies.* This will not mean any major jobs but small jobs here and there will add up."

Oil prices . . .

"From my viewpoint it appears that prices for commodities as a whole should continue to hold because of all the Government regulations which are in force. There will be fluctuations in individual prices but with the controls . . . we would be more apt to have additional inflation rather than deflation. Government spending for war goods and possibly highway construction should tend to help hold the present price line."



OPERATING THE CAT CRACKER—5

What is the effect of FEED PREHEAT . . . *in catalytic cracking?*

by J. W. Moorman

- A topic of keen interest among cat cracking unit designers and operators is the effect of feed preheat on the catalytic cracking operation.
- To appreciate this effect fully it must be considered with respect to:

1. The degree of feed preheat necessary to meet heat-balance requirements.

2. The effect of feed preheat on product distribution and plant capacity. Increasing the feed preheat results in reduced coke yield. This in turn leads to increased plant capacity and improved liquid recovery.

- This article does not purport either to justify or criticize any particular design or operation. Its only intention is to demonstrate that on many commercial units of different design there is a marked effect of feed temperature on unit capacity.

ONE of the most important operating variables in catalytic cracking is the feed-preheat requirement. In many cases it is one of the least understood.

The feed-preheat requirements for any catalytic cracking process are controlled by unit design and by process conditions such as extent of conversion, feed stock, catalyst, etc. These factors determine whether excess heat will have to be removed from the regenerator by means of recycle coolers or internally suspended coils. Thus, units can be designed for liquid or vaporized feed injection, the choice of which is dependent upon several factors such as type of feed, furnace maintenance from the standpoint of coking, and initial investment.

It is obvious that the above factors along with the regenerator and/or kiln and reactor temperatures will dictate the required catalyst circulation rate for constant reactor temperature. What is not recognized in many quarters is the fact that catalyst circulation rate, per se, has a marked effect on product distribution and unit capacity. This effect on product distribution has been demonstrated previously.[1]

1. Heat-Balance Requirements

It has been found, from commercial operation, that the degree of feed preheat in catalytic cracking actually serves two functions: (1) to meet heat-balance considerations for a specific type of design and process conditions, and (2) a separate function wherein catalyst circulation rate affects product distribution for an individual unit. In order to illustrate the effect of feed preheat on unit design and capacity it is necessary to treat the factors separately.

The first of these, namely the degree of feed preheat necessary to meet the heat-balance requirements, is obtained by simple calculations. Detailed heat-balance calculations will not be presented at this time, but some typical simplified results are presented to illustrate the effect on design and the heat-balance requirements. The method employed in arriving at these data is conventional and has been employed for many designs.

TABLE 1—RESULTS OF HEAT BALANCE CALCULATIONS

Basis—900° F. Reactor Temperature
1,080° F. Regenerator Temperature
Synthetic Catalyst
6.0 Weight Per Cent Coke
Once Through

Case No.	Feed preheat (°F.)	Regenerator heat removal duty, M.M. B.t.u./hr.	Required C/O ratio
1	100 (Liquid)	—41	18
2	400 (Liquid)	0	14
3	600 (Liquid)	+20	11
4	800 (Vapor)	+71	6

Results of Heat-Balance Calculations

Table 1 presents the results of some heat-balance calculations. The conditions chosen are arbitrary and represent only a typical plant. These conditions were 900° F. and 1,080° F. reactor and regenerator (or kiln) temperatures, respectively, synthetic catalyst, once-through operation, and a conversion level that would result in a coke yield of 6 weight per cent. Calculations were based on a 15,000-B.t.u. unit.

Alternatives . . . A study of these data demonstrates quite clearly the effect of preheat on either an existing design or a proposed design. Thus, in Case 1 with a 100° F. feed preheat a negative quantity of heat removal is indicated. In

Author is consulting engineer in catalytic cracking, specializing in both fluid and moving-bed techniques for refinery and petrochemical processing.

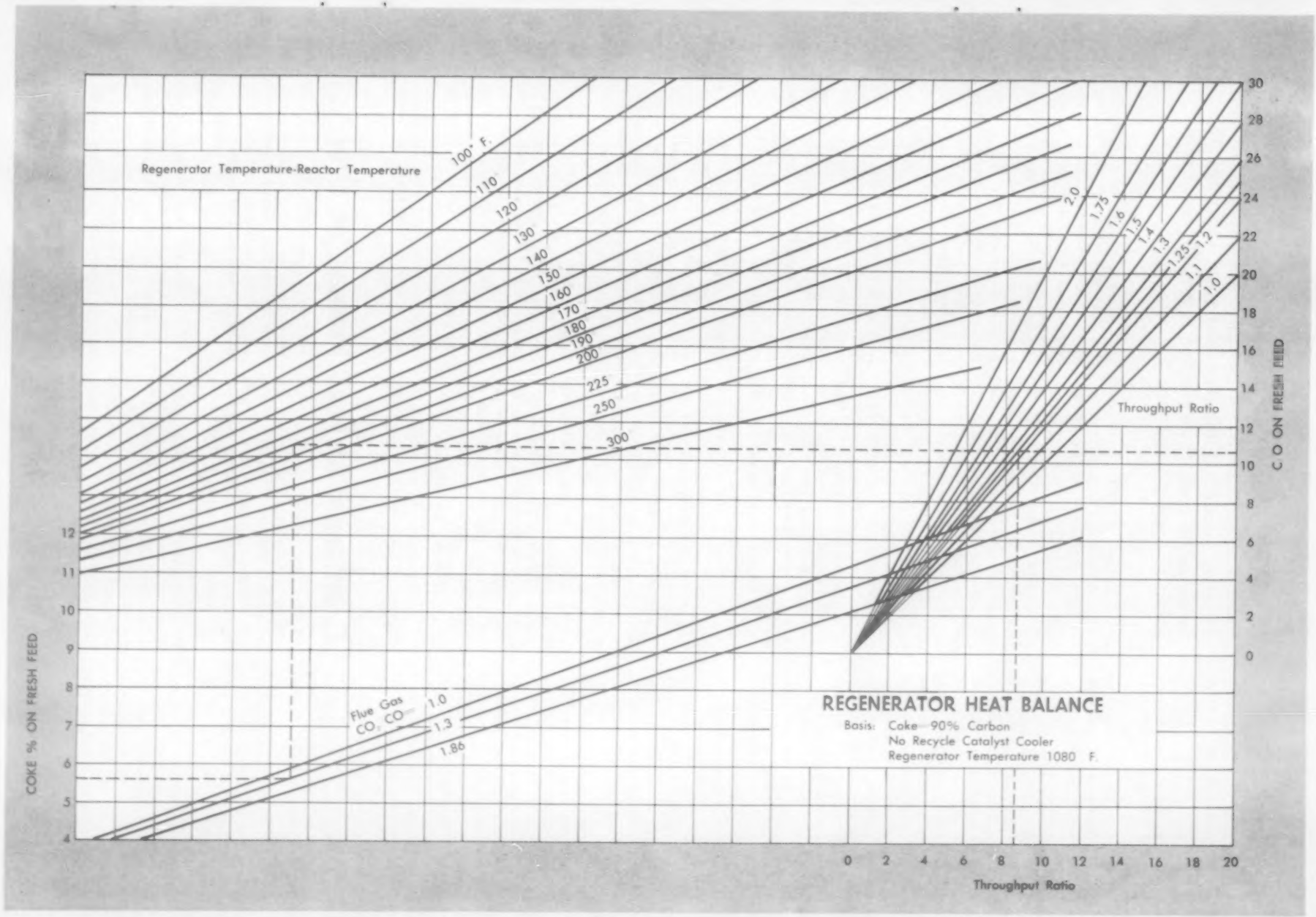

Regenerator Temperature-Reactor Temperature
100° F.
110
120
130
140
150
160
170
180
190
200
225
250
300
Throughput Ratio
2.0
1.75
1.6
1.5
1.4
1.3
1.25
1.2
1.1
1.0
Flue Gas
CO2 CO
1.0
1.3
1.86
REGENERATOR HEAT BALANCE
Basis: Coke 90% Carbon
No Recycle Catalyst Cooler
Regenerator Temperature 1080 F.
COKE % ON FRESH FEED
C O ON FRESH FEED
Throughput Ratio

Fig. 1

other words, in order to break the unit into heat balance, alternatives are available. One, conversion must be increased to deposit additional coke; or two, for the design conditions feed preheat must be increased. The latter is illustrated in Case 2 wherein the feed preheat was increased to 400° F. and the catalyst-to-oil ratio reduced to 14 to 1. If the unit is operated under the conditions of Case 1 the regenerator temperature would immediately drop.

As preheat is increased . . . The result of a further increase in feed-preheat temperature is illustrated in Case 3 where the temperature is increased to 600° F. It will be noted that the catalyst-to-oil ratio was decreased to 11 to 1. In this case approximately 20 million B.t.u.'s must be removed from the regenerator by other means in order to prevent an increase in reactor temperature, or a decrease in conversion level. The results of a further increase in feed preheat temperature is illustrated in Case 4 where the feed is preheated to 800° F. and completely vaporized. In this case the catalyst-to-oil ratio has been reduced to 6 to 1 and the heat that must be removed from the regenerator by recycle coolers or internally submerged coils amounts to 71 million B.t.u.'s per hour.

Three types of units . . . The above demonstrates that in order to maintain the specific conditions set forth, the following three types of units may be designed:

1. Unit without a feed preheat furnace and utilizing only the available heat in liquid-to-liquid exchangers and without a method of removing excessive heat from the regenerator by other means. This is illustrated by Case 2.

2. The unit incorporating a recycle catalyst cooler or internally suspended coils and no feed-preheat furnace, utilizing exchangers for feed preheat or increased conversion with the resultant increase in coke yield as indicated by Case 3. It should also be pointed out that such a design can be utilized where very heavy feed stocks are processed.

3. The installation of a feed-preheat furnace and a recycle catalyst cooler or internally suspended coils as illustrated in Case 4.

Intermediate case . . . Obviously, there is the intermediate case where a low-duty feed-preheat furnace can be installed in place of, or in conjunction with, fresh feed exchangers. The choice of design based upon the conditions stipulated above is dependent upon the initial investment and the flexibility of the process to circulate the catalyst; thus, for a process in which catalyst circulation is limited by mechanical considerations, it may be necessary to employ the type of design as dictated by Case 4 wherein a feed preheat furnace for a regenerator cooling system is required.

" . . it has been found on many commercial units that there is a marked effect of feed preheat on the process, affecting product distribution and plant capacity. This influence on product distribution is a direct result of the effect of catalyst-to-oil ratio."

Heat Balance Chart

Fig. 1 presents a regenerator heat-balance chart for a specific fluid unit design wherein a recycle catalyst cooler was not included. This type of unit is normally termed a "heat-balance system." In other words, essentially all of the heat required to carry out the reaction is supplied by the combustion of product coke. At the same time all the heat released in the regenerator by the combustion of the coke is removed by catalyst circulation to the reactor and by the flue gases. The calculations for Fig. 1 were based upon the design conditions of 59 per cent conversion, 900° F. reactor temperature, 1,080° F. regenerator temperature, a throughput ratio of 1.25 to 1, and synthetic catalyst. The projected coke yield under these conditions was 5.6 weight per cent on fresh feed.

Under these conditions it is indicated from Fig. 1 that a C/O ratio of 10.8 on fresh feed or 8.6 on throughput will be required to maintain the regenerator in heat balance. It should be noted that the CO_2/CO ratio in the flue gases has a marked influence on the required catalyst-circulation rate. This is due to the increase in heat of combustion of the coke with an increase in the CO_2/CO ratio; i.e., the combustion of CO to CO_2.

Over-All Heat Balance

Fig. 2 presents the relationship of the over-all heat balance for the specific design under consideration. From this chart it is predicted that for the specified design conditions the required feed-preheat temperature will be approximately 560° F. at a catalyst-to-oil ratio based on throughput of 8.4 as read from Fig. 1. Now if the feed preheat temperature for the specific case under consideration were increased to, say 650° (for the same reactor and regenerator temperatures), the coke yield must be decreased to 5 weight per cent on fresh feed, in order to maintain a heat-balance system.

In other words, the heat that must be supplied by the catalyst from the regenerator has been reduced by that equivalent to the combustion of 0.6 weight per cent coke on feed. Obviously, this would necessitate a reduction in throughput and/or conversion, which may be undesirable, or the addition of a recycle cooler or other means of regenerator heat removal.

From the above, based entirely upon heat-balance calculations, it is obvious that increasing the feed preheat in an existing catalytic cracking unit might not be economical since such calculations could indicate the necessity for the addition of other equipment and/or a change in process conditions that might be undesirable. However, these calculations demonstrate only that increasing the feed preheat requires a reduction in catalyst circulation rate in order to maintain the reactor heat balance. It is the effect of reducing the catalyst circulation rate on product distribution that cannot be set forth by calculations, but can be determined only by experimental work on an individual commercial unit.

2. Influence of Feed Preheat on Process

It has been believed in most quarters that feed preheat only affects the system heat balance. However, it has been found on many commercial units that there is also a marked effect of feed preheat on the process, affecting product distribution and plant capacity. This influence on product distribution is a direct result of the effect of catalyst-to-oil ratio.[1] The extent of this effect has been found to vary in accordance with plant design and feed stock with the greatest effect being noted on those plants that have been designed with little or no preheat. Thus the greatest benefit of any should be realized for the so-called heat-balance units and the least for those units designed for vaporized feed and a regenerator heat-removal system.

Vaporized Feed

The vaporized feed category is exemplified by the moving-bed processes and some fluid units. In these designs the feed stock is normally vaporized to the extent of approximately 75 per cent or greater and the units are designed with low catalyst-to-oil ratios and a regenerator heat-removal system.

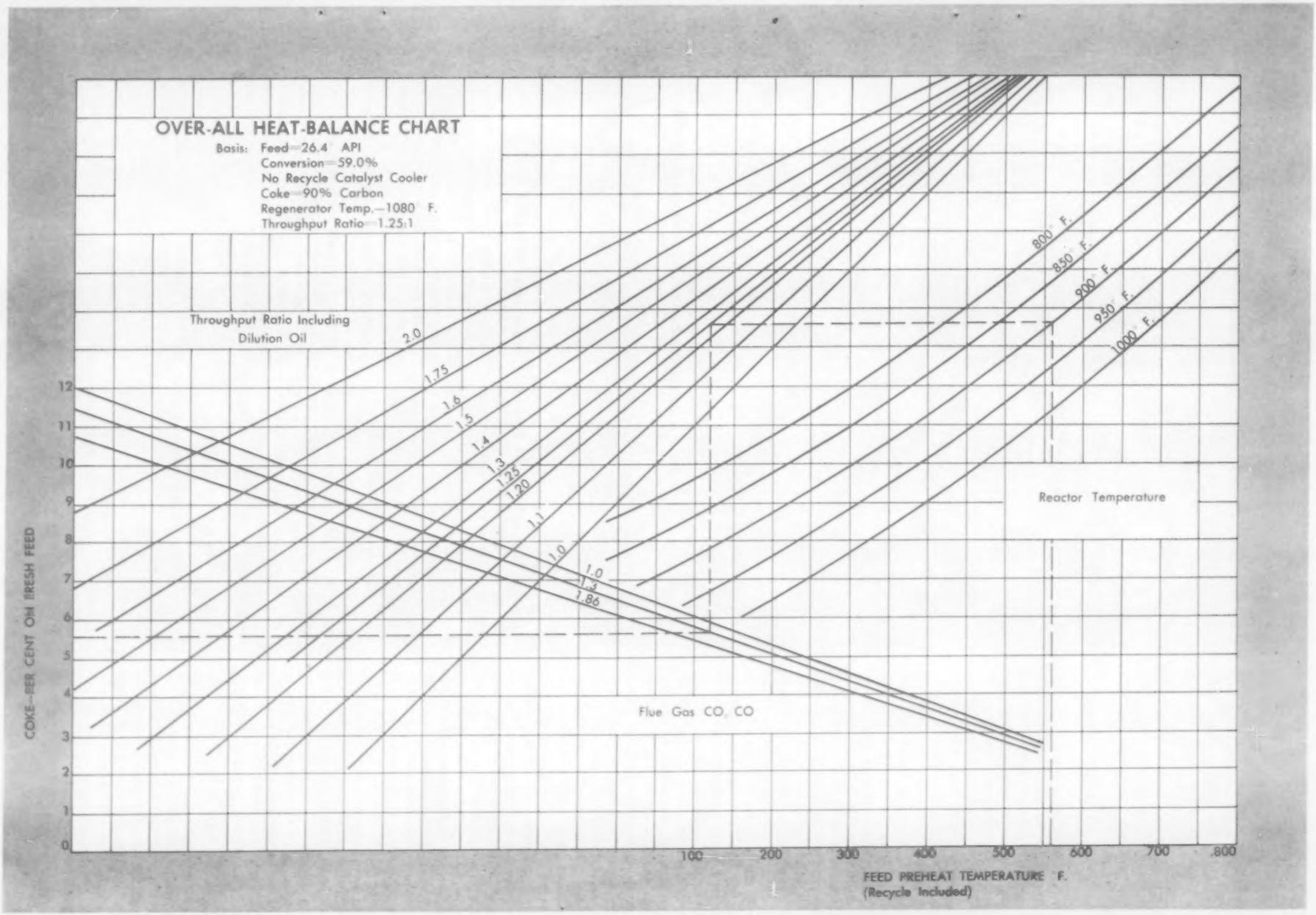

OVER-ALL HEAT-BALANCE CHART
Basis: Feed—26.4 API
Conversion—59.0%
No Recycle Catalyst Cooler
Coke—90% Carbon
Regenerator Temp.—1080 F.
Throughput Ratio—1.25:1
Throughput Ratio Including Dilution Oil
2.0
1.75
1.6
1.5
1.4
1.3
1.25
1.20
1.1
1.0
1.0
1.4
1.86
800 F.
850 F.
900 F.
950 F.
1000 F.
Reactor Temperature
Flue Gas CO, CO
COKE—PER CENT ON FRESH FEED
0
1
2
3
4
5
6
7
8
9
10
11
12
100
200
300
400
500
600
700
800
FEED PREHEAT TEMPERATURE F.
(Recycle Included)

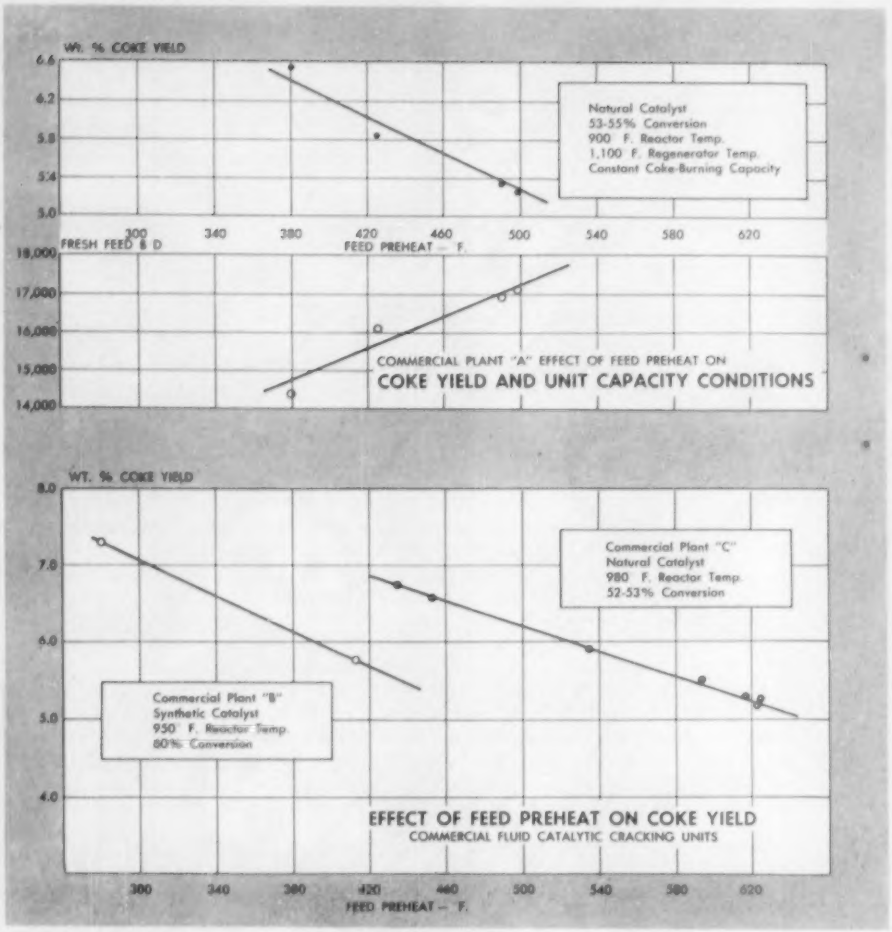
Fig. 2

Very little information is available to determine the effect of feed preheat on the process but it is to be expected that increasing the preheat would have small effect, depending upon the feed stock and furnace coking limitations. In all probability, feed preheat will affect unit capacity in those units designed so catalyst circulation rate cannot be varied.

Fluid Units

In the case of fluid units the determination of the effect of feed preheat on the process has been somewhat more exacting and was developed through several years' commercial operations of many designs. In the original design of the fluid process high feed-preheat temperatures were employed. However, due to the desirability of cracking heavier feed stocks it was found that furnace coking presented a serious maintenance problem when trying to preheat to the extent of either complete vaporization or when processing extremely heavy feed stocks.

Liquid feeds . . . As a result, subsequent designs incorporated the principle of charging liquid feeds and only preheating the feed through exchangers located in the bottoms recirculation system on the fractionator and employing extremely high catalyst-circulation rates. It was during these operations that it was found that these feed-preheat exchangers would sometimes become seriously fouled, especially on the feed side and the result was obviously a reduction in feed-preheat temperature.



Figs. 3 and 4

Reduced capacity . . . Accompanying this reduction in feed preheat it was noted in many cases that the unit suffered a decrease in cracking capacity. In order to maintain unit capacity it was necessary to periodically clean the exchangers. Having noticed this effect, several operating companies installed preheat furnaces to augment the feed exchangers and increase the feed temperature—in some cases to as high as 700° F. The result was an increase in unit capacity, which was realized from a reduction in coke yield at constant conversion, still permitting the operation of the units in heat balance without the use of a heat-removal system in the regenerator.

Coke Yield Reduction

It is this effect, i.e., the reduction in coke yield, that has not been easily understood. Nor has it been possible in the past accurately to predict how much preheat can be tolerated for different feed stocks and conversion levels and still maintain a system in heat balance. As demonstrated previously[1] there is a marked effect of catalyst-to-oil ratio on coke yield. Thus, for one specific commercial unit of the fluid type, decreasing the catalyst-to-oil ratio from 8.5 to 1 to 7.0 to 1 decreased the coke yield from 6.5 weight per cent. Since this was a heat-balance unit, net effect was an increase in unit capacity of about 23 per cent since carbon-burning capacity was maintained constant.

Commercial Plant Data

In view of the above, a study has been made of the available data obtained from commercial-plant operations. The results are presented in Figs. 3 and 4. These data were obtained from the operations of three commercial fluid units of different designs, with different feed stocks and catalysts. All three were operated at constant coke-burning rates and the heat of coke combustion was removed from the regenerator by catalyst circulation to the reactor (meaning constant catalyst circulation rate) and by flue gases. In all cases conversion, reactor temperature, and regenerator temperature were held constant.

Fig. 3 presents the data obtained on Plant A and is a plot of feed preheat versus coke yield and fresh-feed rate in barrels per day. The effect of increasing feed preheat is quite marked. Thus, increasing the feed preheat from 380° to 500° F. decreased the coke yield from 6.4 to 5.3 per cent and increased the fresh feed rate from 14,750 to 17,300 bbl. per day. The decrease in coke yield amounted to 21 per cent and the increase in feed rate amounted to 17.5 per cent.

Fig. 4 presents some data obtained from two other commercial units. For Plant B, using synthetic catalyst, the feed preheat was increased from 280° to 412° F. resulting in a decrease in coke yield from 7.3 to 5.8 weight per cent, or a reduction of 26 per cent. For Plant C, using natural catalyst, increasing the feed preheat from 435° to 620° F. resulted in a decrease in coke yield from 6.75 to 5.25 weight per cent or a reduction of 28.5 per cent.

Other information . . . In addition to these specific data, other more general information indicates identical trends for many plants. Thus, one operating

Earlier articles . . .

Articles which have appeared in this series in earlier Journal issues:

1—What Has Been Happening in Catalytic Cracking?, November 2, 1953, page 92.

2—Some Factors in F.C.C. Operation, November 9, 1953, page 116.

3—How Conversion Level Affects Product Distribution, January 4, 1954, page 76.

4—Space Velocity and Catalyst-to-Oil Ratio, March 8, 1954, page 106.

company states that decreasing the preheat from 600° to 400° F. results in a loss in capacity of 33 per cent. Still another company has stated that increasing the feed preheat from 300° to 600° F. resulted in a reduction in coke yield of 1.5 weight per cent under constant conditions of conversion, temperature, etc.

What Is Economical Preheat Temperature?

At the present time it is not possible to establish any positive method of predicting the economical feed-preheat temperature that can be used for any specific existing unit or for design purposes. Every individual plant will have an economical maximum feed preheat temperature above which the system will be out of heat balance, necessitating the use of an additional heat-removal system for the regenerator.

There are a number of heat-balance units operating with feed-preheat temperatures in the order of 650°-700° F. On other units the maximum that can be tolerated is in the order of 500° F. It is indicated from a review of operating plants that the minimum preheat for any heat-balance unit should be in the order of 500°-600° F. Increasing the preheat temperature from, say 300° to 600° F., can result in an increase in capacity of from 25 per cent to as great as 50 per cent depending upon conversion, catalyst, feed stock, design, and amount of recycling. The effect of recycling on the heat balance is indicated in Figs. 1 and 2.

Employing heat charts . . . In analyzing any particular unit it will be necessary to make heat-balance calculations similar to those presented in Figs. 1 and 2, taking into consideration the CO_2/CO ratio, the hydrogen in coke, extent of recycling, conversion, temperatures, etc. General heat-balance charts can be constructed from which predictions can be made with reasonable accuracy. However, specific charts for a given unit cannot be employed for other units.

For example, Figs. 1 and 2 cannot be employed for Plants A, B, C represented in Figs. 3 and 4 due to the fact that Figs. 1 and 2 were based upon specific conditions that were not realized in the operations of the other units.

The effect of feed preheat and/or catalyst circulation rate noted herein on product distribution for a catalytic cracking unit is not only startling but also not easily understood. It is a well-known fact that spent-catalyst stripper designs have been studied in great detail for many years. As a result of these studies many improvements have been made so that today the amount of strippable material that might be carried to the regenerator has been reduced to a negligible quantity. However, these strippable materials mainly consist of entrained hydrocarbon vapors and do not include liquid unreacted hydrocarbons that could possibly adhere to the catalyst.

In other words, there appears to be a second stripping problem, namely, the removal of liquid hydrocarbons. This implies that the catalyst carries to the regenerator not only true catalytic coke but also some unreacted oil fed to the unit. This, of course, is theory only and has at this time no basis of fact. The data presented herein and other data tend to confirm such a possibility.

"One operating company with an 8,000-bbl. per day catalytic cracking unit has stated that with a fixed fresh-feed rate, increasing the feed-preheat temperature from 400° to 600° F. at constant conversion has resulted in a savings of approximately $500 per day."

"I'll stake the spot where I advise you to drill."

What Are the Economics?

Consideration of the above data and the proposed theory clearly indicates that in addition to the effect of increasing feed preheat on coke yield (which in turn affects unit capacity and/or extent of conversion for a fixed fresh-feed rate), the conversion of unreacted liquid hydrocarbons to catalytically cracked products must be of some advantage. In other words, if the theory that heavier liquid hydrocarbons are adhering to the catalyst holds, there must be some advantage to the conversion of these liquid hydrocarbons to salable materials.

Savings . . . One operating company with an 8,000-bbl. per day catalytic cracking unit has stated that with a fixed fresh-feed rate, increasing the feed-preheat temperature from 400° to 600° F. at constant conversion has resulted in a savings of approximately $500 per day. Still another operating company has demonstrated that under similar conditions its saving would be in the order of $350 to $650 per day. In the case of Plant A, previously discussed, the debutanized gasoline yield increased from 39.2 to 43.2 volume per cent, this being accomplished by an increase in feed-preheat temperature of from 380° to 490° F.

Thus, it is demonstrated by actual commercial operation that the effect of increasing feed preheat has been beneficial, not only from the standpoint of unit capacity and/or extent of conversion, but also from the standpoint of a materially improved product distribution. It is, of course, obvious that the magnitude of benefits which may be achieved by increasing feed preheat will vary in accordance with feed stock, type of catalyst, and catalyst activity, and the general refinery product disposition that may be encountered at the plant.

Nevertheless, there appears to be little doubt that the feed preheat in any catalytic cracking unit, including the moving-bed and fluid types of designs, is an extremely important variable having marked effect upon the economics of the operation of not only the catalytic cracking unit per se, but also the over-all refining operation.

Reference

1. Moorman, J. W., preceding article in this series, The Oil and Gas Journal, March 8, 1954, page 106.

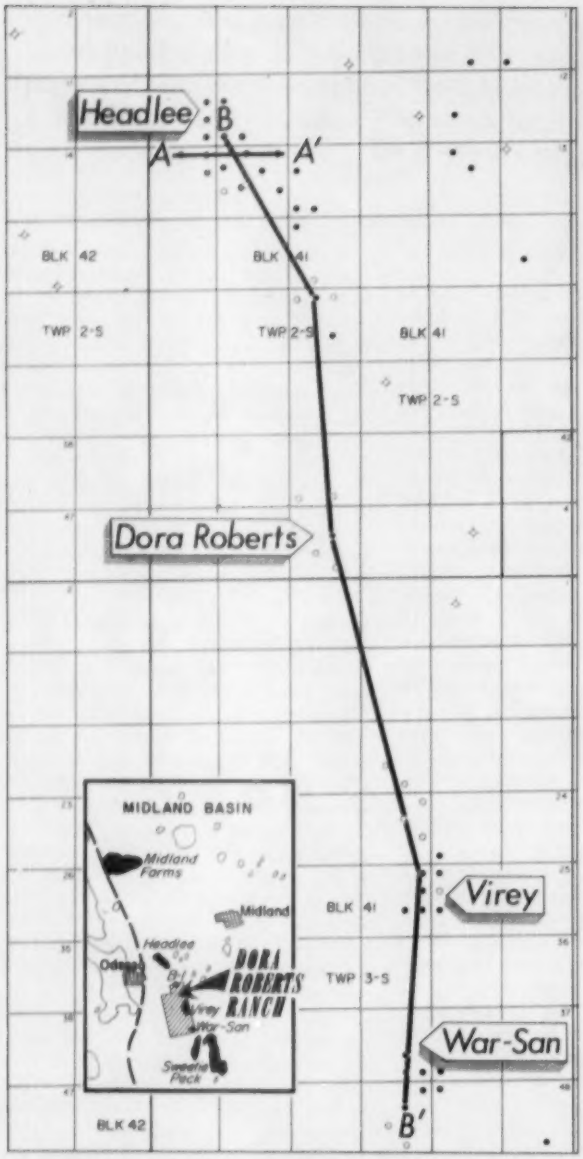
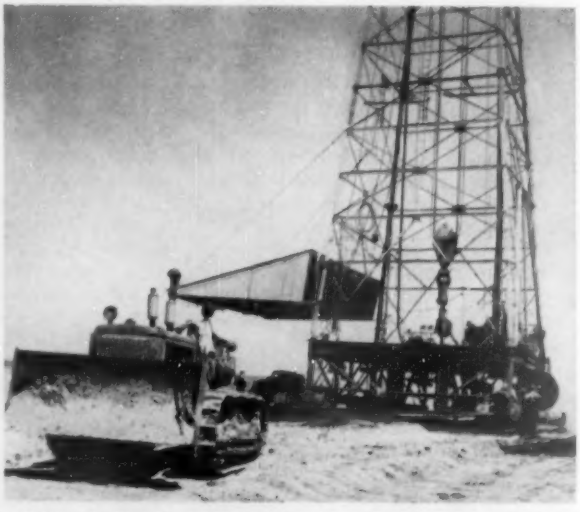


FIG. 1—Discovery of the Dora Roberts trend has added materially to the Ellenburger reserves of West Texas. (Map courtesy of Midland Map Co.).

Both heavy-duty cantilever masts and standard derricks are used on the Dora Roberts trend.



Skidding the large standard derricks has become a routine operation and saves valuable time during rigging up and tearing down.

Dora Roberts trend . . .

West Texas' Most Active Deep-Development Area

Few problems exist; 13,500-ft. wells require 100-120 days

by Norman S. Morrisey
Drilling and Development Editor

DRILLING on the Dora Roberts trend has expanded rapidly to become the most active deep development in West Texas.

This trend now has Ellenburger production from a string of discoveries 17 miles long, extending from Headlee field south to Sweetie Peck (Fig. 1). Additional wells probably will define a series of producing areas rather than one tremendous field. The present aggressive drilling campaign keeps 19 rigs busy developing the rich Ellenburger pay zone, found at 13,000-13,500 ft.

All these tests are located on the most important structural feature found

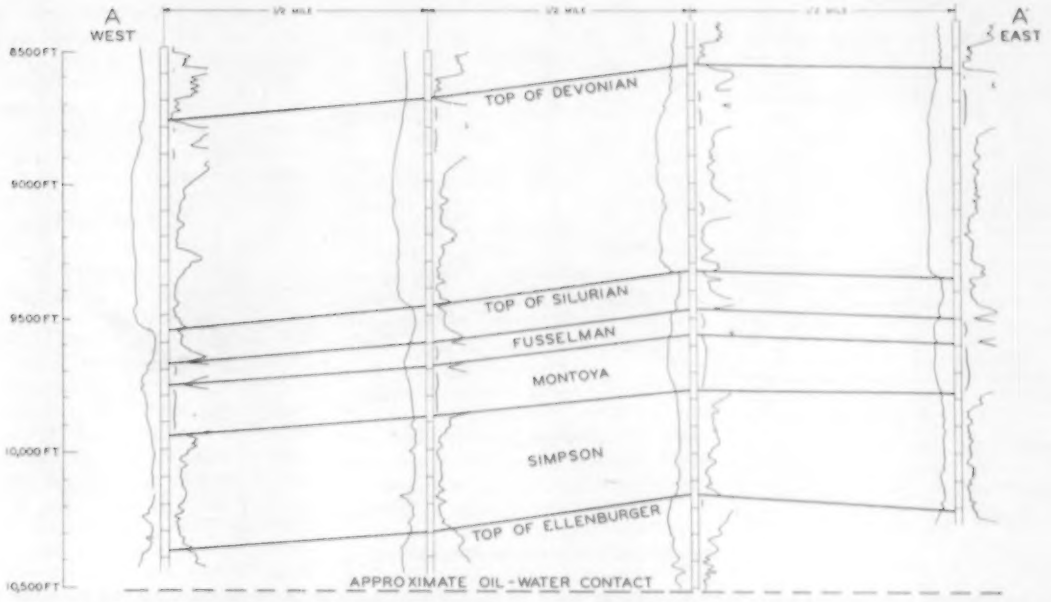


FIG. 2—West-East cross-section through Headlee field shows a large anticline with more than 350 ft. of pay above the oil-water contact. Wells on the northeast flank have encountered steep dip that is not shown in this section. (Logs courtesy West Texas Electrical Log Service.)

in West Texas in many years, according to geologists.

Drilling on the trend presents relatively few problems, and the 13,500-ft. tests are completed in 100-120 days depending upon the amount of coring and testing required.

Discovery of Headlee in early 1953 innocently started what has now become a major drilling program. West Texas geologists reasoned that Headlee, Sweetie Peck, and Pegasus were closely related to the same or similar structural trends on the west side of the Midland basin. They reasoned further that similar fields should exist between the Headlee discovery and the Ellenburger fields to the southeast at Pegasus and Sweetie Peck (Fig. 1).

Forest Oil Corp. and Cities Production Corp., a wholly owned subsidiary of Cities Service Oil Co., leased the 19,000-acre Dora Roberts ranch based on this premise for 5 million dollars plus two Ellenburger well commitments. After seismic work confirmed the presence of structure, these companies staked two wildcats, both of which were completed as Ellenburger discoveries. Since then, development on the trend has accelerated rapidly.

Land situation . . . Until recently, oil companies felt that the land situation was very unfavorable along the Dora Roberts trend. The land in this part of West Texas is controlled by a handful of large ranch owners who have insisted on leasing their land at the going price of $100 per acre, prior to seismic work. Oil companies were not permitted to do geophysical work unless they were willing to lease a large block of land. This posed a serious problem and retarded normal exploration in this part of the Midland basin. Most operators are not in a position to lease land without evidence of possible structure. Some of the ranches cover as much as 40 sections and would require at least 2½ million dollars to lease. This means that only major oil companies or combines can enter the area, assuming of course that they are willing to risk that much capital with very little scientific information to back their plays.

Forest Oil Co. and Cities Service gambled on trend geology and entered the area on a 5-million-dollar deal. Their aggressiveness may serve as an example for other oil companies.

Geology . . . The Dora Roberts trend lies on the west side of the Midland basin, in western Midland and eastern Ector counties. This line of folding parallels and is closely related to the Central Basin platform that lies to the west (Fig. 1).

During early Paleozoic time, much of West Texas was covered by marine seas and the present-day structural features were not of major importance. As a consequence, the Ellenburger and younger pre-Pennsylvanian formations cover a wide area of West Texas. Although minor unconformities are present in the geologic section, it was not until Pennsylvanian time that a major uplift occurred.

This orogeny produced many of the major structural features of West Texas such as the Central Basin platform, the Midland basin, and the Delaware basin. It probably developed most of the present Ellenburger producing areas.

Continued growth or rejuvenation of many of these structures during Permian deposition arched the Permian beds so that many of the important underlying Ellenburger features are reflected in the Permian formations.

The Dora Roberts trend was formed during the Pennsylvanian uplift and is a pronounced anticlinal flexure with at least 500 ft. of relief. There is a strong possibility of faulting along the east side of this prominent fold.

The Reservoir

Principal target on the trend is the Ellenburger formation that consists of fractured dolomitic limestone. At Headlee, limited core data showed an average porosity of 2 per cent and an average permeability of only 1.1 md.

The oil-water contact along the trend is remarkable because several wells have established the zone at nearly the same datum of about 10,500 ft. subsea. At Headlee, it is reported at 10,526 ft. subsea; at Virey, about 10,500 ft. subsea; and at Sweetie Peck, 10,440 ft. subsea. The oil-water contact has not yet been determined at War-San.

Gross pay thicknesses vary from 100 to nearly 500 ft., depending upon the well location with respect to the oil-water contact. Present plans are to develop the field on 80-acre spacing. Development of the trend has not reached the point where operators can accurate-

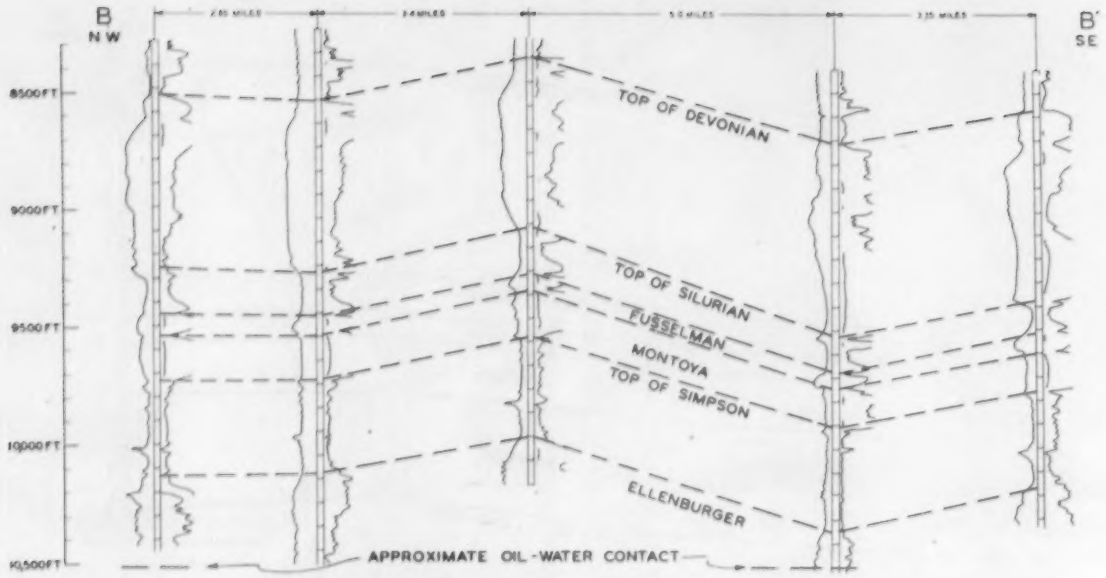


FIG. 3—The Dora Roberts trend has considerable relief as shown by the above cross-section. It appears probable that there will be several separate producing areas on the trend, rather than one large pool.

ly predict reserves. In other Ellenburger producing areas, some operators estimate recoverable reserves on the basis of 75-100 bbl. of oil per acre-foot of gross pay thickness. If this should apply to the Dora Roberts trend, Headlee with an estimated average pay thickness of 250 ft. may eventually produce over 100 million barrels of oil.

Headlee

Texas Gulf Producing Co. discovered Headlee in early 1953, with production from the Devonian and Ellenburger. It is a northwest-southeast trending anticline with a maximum of 400-500 ft. of pay above the oil-water contact at Ellenburger level (Fig. 2). The pay zone is a coarsely crystalline, fractured dolomite with relatively low permeability.

Top of the Ellenburger pay zone is found at about 13,000 ft. and the oil-water contact has been established at 10,526 ft. subsea or at a drilling depth of about 13,436 ft. Operators are developing the zone on 80-acre spacing.

First Devonian producer at Headlee was Texas Gulf Producing Co. 4 Headlee, completed on August 14, 1953, for an initial potential flowing of 211.38 bbl. of oil in 13 hours.

The discovery well, Texas Gulf Producing Co. 1 Headlee, tested a Wolfcamp zone between 9,160-9,200 ft. that flowed 30 bbl. of oil in 15 minutes.

Ellenburger area . . . Proved or semi-

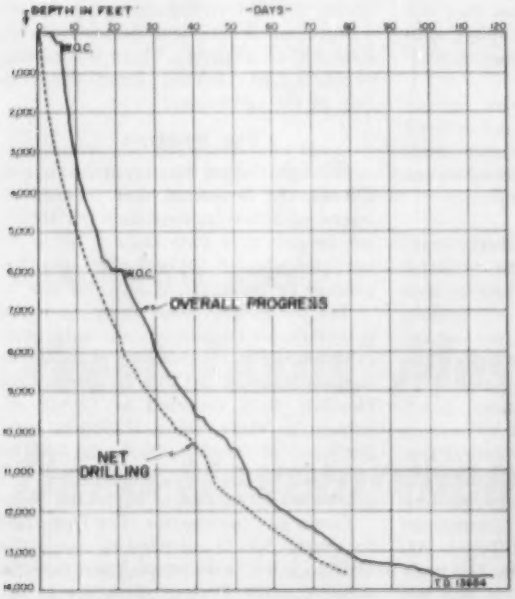
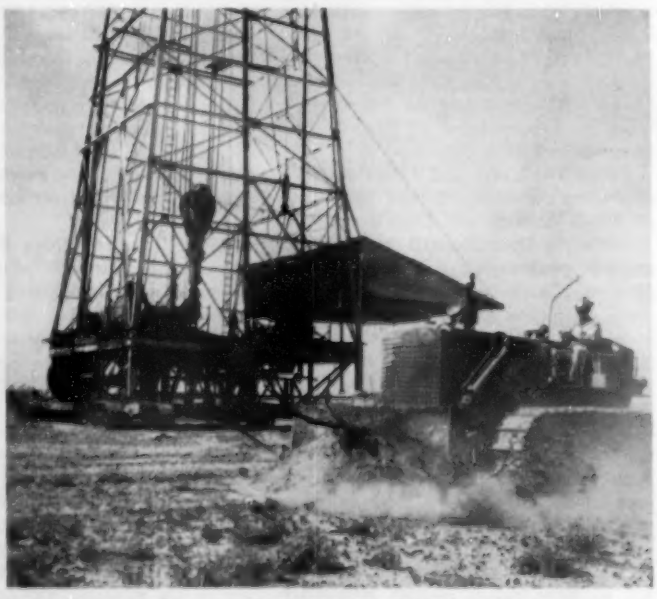


FIG. 4—Coring and testing s'ow down drilling considerably at Headlee and on the Dora Roberts Trend. Exploration Drilling Co. required 116 days to drill and complete the above well.



Contractors reach the top of the Devonian in 50-55 days. Some contracts are let on a sliding day-rate scale below this key marker.

proved production at Headlee covers an area of nearly 4,000 acres. Pay thicknesses range from less than 200 ft. to nearly 500 ft. Wells are usually completed flowing for over 600 bbl. of oil per day. At the present time the field is 3½ miles long and 1½ miles wide. It is still expanding although two dry holes have been drilled to define the Ellenburger producing limits on the northeast side of the field.

At the present time there are 22 Ellenburger wells; several of these were dually completed as Devonian producers. Headlee was extended 1½ miles southeast by the British-American Oil Co. 1 Parks Estate, completed for an initial potential of 740 bbl. of oil per day. This well (Fig. 3) is higher than the discovery well, indicating that critical southeast dip has not been defined.

Headlee may link up with the Forest Oil Corp. and Cities Service 1 Dora Roberts B-1, discovery well of Dora Roberts field. It is quite probable, however, that some of the present fields on the trend will be separated by barren areas.

Dora Roberts Field

Forest Oil Corp. and Cities Service discovered this field with their 1 Dora Roberts B-1, completed from 200 ft. of Ellenburger pay for a daily output of 2,163 bbl. of oil. It is the highest well on the trend thus far and has over 500 ft. of Ellenburger above the oil-water contact that has been established at Headlee and Virey between 10,400 and 10,500 ft. subsea (Fig. 3).

Virey

Ellenburger production was established at Virey in May 1954 with the completion of Warren Petroleum Corp. 1 H. C. Wallen for an initial potential of 671 bbl. of 52°-gravity oil per day from 30 ft. of perforations. There are seven Ellenburger wells and no dry holes. In addition to Ellenburger pay, Virey also produces from the Pennsylvanian.

Although the east dip at Virey has been established, no critical west dip has been logged as yet. It is difficult to forecast the size of the producing area because of insufficient well control.

War-San

First production at War-San was from the Pennsylvanian, discovered by Warren Petroleum Corp. at 10,780 ft. Forest and Cities Production proved Ellenburger pay with the first well drilled on the Dora Roberts ranch. Their 1 Dora Roberts C-4 was brought in for an initial potential of 3,170 bbl. of oil per day. The northeast offset to this well was 170 ft. low, but logged 200 ft. of Ellenburger. The Ellenburger pay here was tight and not considered commercial. Operators plugged back and completed this well in the Pennsylvanian.

Drilling

Main drilling problems are lost circulation in the Spraberry, Pennsylvanian, and Ellenburger formations and possible blowouts while drilling through the Pennsylvanian section. Contractors normally use a 9-10-lb. mud to overcome these hazards.

Casing programs vary slightly but usually call for three strings. Some operators run a liner to protect the Pennsylvanian pay zones and then run casing to total depth when the Ellenburger pay is reached.

The wells require about 100-120 days to drill and complete, using 110-120 bits. Both standard derricks and cantilever masts are used, although many contractors prefer the standard derrick.

Footage prices range from $8.95 to $9.50 per foot; day rates are on a sliding scale from $800 to $1,250 per day with drill pipe, depending upon depth and terms of the contract.

Chert in the Devonian slows contractors down, but it occurs as streaks rather than a continuous zone. As a consequence, they normally do not use chert bits while drilling through this zone. Normal time to the top of the Devonian at Headlee requires about 55 days.

Considerable time is spent in coring and testing along the trend at the present time. As development work progresses, drilling time will be reduced considerably.

Operators complete the Ellenburger wells in the open hole or through perforations. A few wells have been dually completed in the Ellenburger and Pennsylvanian zones.

Operators normally acidize the Ellenburger prior to completion. This is done in several stages, sometimes using a total of 21,000 gal.

Wells are completed above the oil-water contact insofar as possible because experience has shown that most Ellenburger fields have an active water drive. Edge wells tend to go to water rapidly because of the "coning effect" of the Ellenburger water drive. It is probable that the fields on the Dora Roberts trend will also have a strong water drive as the source of energy, but there are not enough data available to confirm this conclusion.

Only the beginning . . . Production on the Dora Roberts trend marks the start of an active exploration and drilling program for this part of West Texas. Ellenburger fields stretch from Andrews County southeast to Upton County. Anywhere along this 100-mile trend, oil companies may find producing areas comparable to the Dora Roberts trend.

BOOKS

PRINCIPLES OF ENGINEERING THERMODYNAMICS. By Paul J. Kiefer, Gilbert F. Kinney, and Milton C. Stuart. Published by John Wiley and Sons, Inc., New York. 539 pp., $7.75.

This second edition of this book is almost completely rewritten. It provides a concise and effective presentation of the basic material specifically designed to serve the requirements of the engineer. It covers the thermodynamic basis of fluid mechanics and aerodynamics and unifies the mechanical and chemical applications in a manner applicable to current engineering practice.

The book incorporates a number of unusual features. Among these are: (1) the conventional steady-flow energy equation is supplemented by a parallel equation of mechanical antecedents; (2) the thermodynamic properties of ideal gases are developed and facilities furnished so that specific heat variation is easily provided for in process analyses; (3) facilities are developed enabling ready correlation of the properties and the analysis of typical process with nonideal high-pressure gases; and (4) careful attention is given to chemical equilibrium and its influence on flame temperature use in combustion.

A.S.T.M. STANDARDS ON BITUMINOUS MATERIALS OF HIGHWAY CONSTRUCTION, WATERPROOFING, AND ROOFING. Published by American Society for Testing Materials, Philadelphia. 488 pp., $4.

The September 1954 edition of this compilation brings together in compact, readily usable form 110 A.S.T.M. standards, including 62 test methods; 42 specifications; 4 definitions of terms relating respectively to bituminous waterproofing and roofing materials, materials for roads and pavements, specific gravity, and timber preservatives; and 2 recommended practices, 1 for accelerated weathering test of bituminous materials and 1 for bituminous mixing plant inspection.

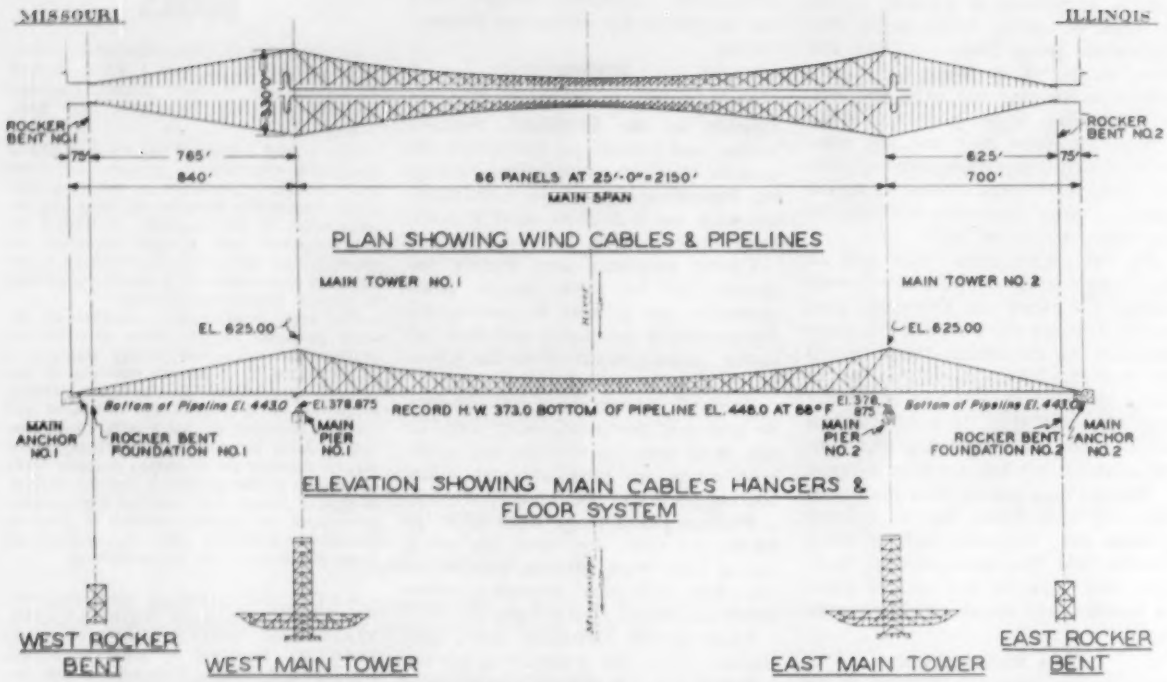
Test methods and specifications cover: highway construction materials; waterproofing and roofing materials (such as asphalts, coal-tar pitch, fabrics, felts, shingles, and creosote); also viscosity by means of the Saybolt Viscosimeter; volume correction tables, and many others.

New material includes test methods for: asphalt insulating siding surfaced with mineral granules; staining properties of asphalts (modified pressure method). Saybolt Furol viscosity of asphaltic materials at high temperatures; and specifications for bituminous-saturated, woven-burlap fabrics.

SOUTHEASTERN AND SOUTH-CENTRAL MISSOURI—Guide Book, seventeenth regional field conference. Published by the Kansas Geological Society, 508 East Murdock, Wichita. 63 pp., $4.

This guide book is designed primarily to acquaint the geologist with the type areas of the Cambrian and Ordovician stratigraphic units as they occur on the outcrop. These units have been traced westward from the surface of southeastern Missouri into the oil fields of Kansas and Oklahoma. In addition to stratigraphy, other features of structure, sedimentation, and lithology are covered, such as initial dips and basal conglomerates in the Cambrian, high porosity in coarsely crystalline Arbuckle dolomite, a major fault zone, barite workings, and the largest single-outlet spring in the United States. There are also several papers on the geology of southeastern Missouri.

A detailed road log is included for the convenience of those interested in retracing the route of the field trip.



Details of world's longest pipeline suspension bridge which crosses Mississippi River near Grand Tower, Ill.

Texas Illinois Jumps "Ol' Man River" With

World's Longest Pipeline Suspension Bridge

Designed to support two 30-in. pipelines 75 ft. above the highest-recorded water level, this 2,150-ft. structure will eliminate all danger of line damage from the formidable Mississippi River.

by M. J. Paul, J. E. Thompson, and Ray Leach

THE world's longest pipeline suspension bridge, being constructed for Texas Illinois Natural Gas Pipeline Co., will soon be supporting two 30-in. gas pipelines in an aerial crossing of the Mississippi River. The structure is expected to be completed by March 1955 and will replace three 20-in. underwater crossings—eliminating danger of line damage and service interruption due to floods or bottom shifts of the great river.

The bridge has a main span of 2,150 ft. and measures 3,690 ft. from anchor to anchor. The main towers extend 246 ft. above the concrete supporting piers and the pipeline, at center span, will be supported some 75 ft. above the highest recorded level of the Mississippi at that point.

Authors are with Texas Illinois Natural Gas Pipeline Co. and are, respectively, chief engineer, superintendent of pipeline construction, and senior engineer.

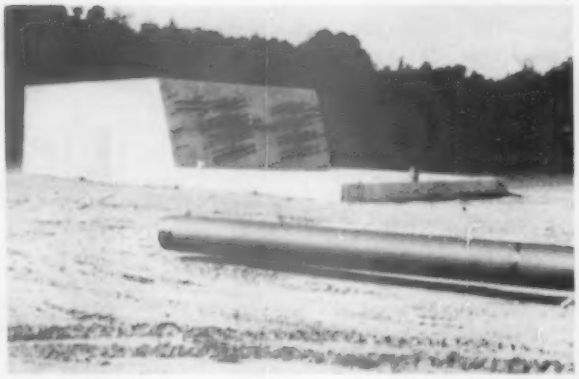
Construction has been under way since September 1953 and when completed the bridge will have cost approximately 3¼ million dollars. Preparatory work extends back to 1950 when plans for the bridge were first laid. From then until construction started, a great amount of exploratory work went into selection of the best possible site. The final selection was made on the basis of its proximity to the existing pipeline, the protection from flood damage which the terrain afforded the anchors, distances between main towers and between anchors that would allow the design to be within reasonable limits, and test borings which indicated feasibility of suitable foundation construction.

Planned for 1951 . . . The Mississippi River bridge is the last of the four scheduled aerial river crossings to be constructed on the Texas-Illinois gas pipeline. Other crossings above major rivers are over the Colorado and Brazos in Texas and the Red in Arkansas.

Originally, the construction of the Mississippi crossing was scheduled to start in 1951 but, due to the steel shortage resulting from the Korean War and other factors, the construction of the bridge was postponed. As a result, plans were revised and a submerged crossing of three 20-in. pipelines was made. This submerged crossing proved successful in that it enabled completion of the pipeline on schedule, but the aim of a river crossing free from the hazards encountered in a submerged crossing was not achieved.

In the spring of 1952, Matthews & Kenan, consulting engineers, San Antonio, were instructed to proceed with the design of a suitable bridge for the river crossing. Basically, the bridge was to be designed to carry two 30-in. pipelines across more than 2,000 ft. of water and river bank at a height sufficient to cause no interference with navigation regardless of river water level.

Installation of waling for east-side anchor. Each anchor required about 2,500 yd. of concrete.



Completed anchor and 30-in. pipe for crossing. Bolts for main and wind cables are 2¾ in. by 31 ft. and 3¼ in. by 20 ft.

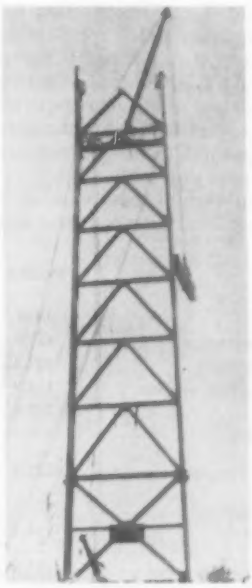
Contracts for the construction of the substructure of the bridge were awarded on August 18, 1953, to Massman Construction Co. The American Bridge Division of U. S. Steel Corp. was awarded the contract for the fabrication and erection of the superstructure. The first actual construction work was begun on September 30, 1953, when the Massman Construction Co. began excavating at the site of the main anchor on the Missouri side.

The bridge, as finally designed and now under construction will be the world's longest main-span pipeline suspension bridge, and will span the river between Grand Tower, Ill., and a point approximately 1½ miles south of Wittenburg, Mo. The bridge structure is designed for a wind load of 27 lb. per sq. ft. on all circular and convex surfaces, 40 lb. on all flat surfaces, and for an ice load on the main cables of 107 lb. per lineal foot.

Preliminary to the designing of the bridge substructures, test borings were made at the sites of the main piers and anchors. It was determined by a study of the borings that the pier and anchor on the Illinois side could be founded on rock by open excavation, and that the foundations for the main pier and anchor on the Missouri side would require approximately 150 ft. of penetration to reach bed rock. The main pier on the Missouri side is of caisson type, and the 2,470-cu.-yd. anchor is supported by bearing piles driven at an angle of approximately 18° into bed rock. The centerline of the cable anchorage lies 840 ft. in back of the main pier on the Missouri side and 700 ft. in back of the main pier on the Illinois side.

Trouble with caisson . . . In construction of the piers and anchors, both of the major foundations on the Illinois side were completed without unusual difficulty; but the caisson-type pier on the Missouri side was a headache for all—company, contractor, and engi-

Forms for pouring of main tower pier on Illinois side of river.



Erection of top strut in east side main tower.

Completed pier as tower construction started. Towers extend 250 ft. above piers.

neers. The construction of this pier required over 7,000 cu. yd. of reinforced concrete. In all, 15 lifts were required to construct the pier shaft which was over 163 ft. in height from the cutting edge to the bridge seat.

The first open dredging began on December 15, 1953. After 4 months of sinking and with the thirteenth lift in place, open dredging was discontinued and air operations were begun. Prior to establishing air operations, deep wells were utilized to lower the water table. The use of these wells permitted 120 ft. of penetration without pressuring the caisson.

On May 5, 1954, the dredge wells were plugged, and pneumatic dredging was begun. Air operations were initiated at 17.5 psi., and were gradually increased to a maximum of 48 psi. on July 24.

On June 30, with the cutting edge at elevation 215.90, almost 6 ft. above the planned landing elevation of 210.0±, a fracture was discovered on the interior of the working chamber wall and ceiling. Sinking operations were discontinued, and the contractor was authorized to proceed with the completion of the pier by underpinning the cutting edge to bed rock. This underpinning consisted of a 12-in.-thick concrete wall that was poured in staggered sections beneath the perimeter of the cutting edge and the rock formation. In excavating for the underpinning structure, a large fissure was discovered in the foundation. The bottom of the fissure was at elevation 195.7, approximately 20 ft. below the cutting edge. To prevent the danger of a serious blow-in and possible loss of the caisson, cleaning of the material from the fissure was abandoned and a concrete pad was poured 6 ft. above the bottom of the fissure on a solid clay material.

Foundation Becomes Reality

On July 30, concrete was poured into each of the three dredge wells to a depth of approximately 25 ft. above the cutting edge to seal off ground water. With the seal established, the foundation became a reality. On this same day the American Bridge Co. began erection of the main tower on the Illinois side. This tower, with the exception of the wind trusses, is now completely erected and work has begun on the erection of the main tower on the Missouri side.

The distance between the main towers of the bridge is 2,150 ft. with the low steel at midstream approximately 75 ft. above highest recorded elevation of the river. The main towers, 246 ft. high with 145-ft. wind trusses, support a suspension system consisting essentially of two main cables each composed of twelve 2-in. prestressed wire ropes with a minimum ultimate strength of 372,000 psi. The catenary curve of the main cables drops 165 ft. from the point of tangency atop each tower. Eighty-six 25-ft. panels of ⅝-in. wind guys, main-suspender ties, and supports compose the cable network between the towers. Rocker bents (small, free-rocking towers) will be constructed in front of each anchor to support the main cables. The first main cable was pulled across the river in November.

"You oughtta' let me handle your deals for ya, Mac—I just sold a lease to a guy in Texas or someplace for $40,000."

The two 30-in. pipelines with a wall thickness of 11/32 in. will ride the floor beams in a shallow arc rising approximately 5 ft. at midstream from the elevations of the pipe at the towers. The pipelines are designed on a basis of a maximum operating pressure of 860 psi. at a 100° F. temperature differential. The two lines will be free to move longitudinally on the bridge structure. Flexibility in the system is obtained at ground level by the use of a horizontal offset U-bend with legs approximately 50 ft. long, immediately preceding a vertical rise of about 75 ft. to the bridge structure. The 30-in. approach lines to the bridge are now complete.

Although the completion of the substructure of the bridge was delayed approximately 5 months, it is now believed that the bridge will be completed by March 1955.

Despite the difficulties and delays encountered, the completion of the bridge together with the present underwater lines will insure Texas Illinois against interruption of service despite one of nature's most formidable obstacles.

Refinery Construction Index at New High

by W. L. Nelson
Technical Editor and Petroleum Consultant

The Oil and Gas Journal-Nelson Refinery Construction Index for September 1954 was 181.7, 8.2 points higher than the final value for 1953. Cost increases are shown in all items reported in the index except for heat exchangers, which dropped 8.5 points as outlined in the accompanying table.

The Journal-Nelson Index consists of materials and labor components, with 40 per cent of the total index being devoted to materials and 60 per cent to labor. The materials component is computed from information released by the Bureau of Labor Statistics, and the labor component is compiled largely from statistics in Engineering News Record.

The final index value is given in percentage of the cost in the year 1946.

INDEX (1946 = 100)

	1948	1950	1951	1952	1953	Sept. 1954	% over last mo.
Pumps, compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.6	0
Electrical machinery	127.6	134.9	154.3	154.2	156.4	159.4	0
Internal-combustion engines	116.9	126.0	146.1	146.5	148.1	150.6	0
Instruments	120.0	127.8	142.3	146.2	151.8	153.9	0
Heat exchangers	130.0	140.0	152.0	165.8	174.9	166.4	0
Miscellaneous equipment average	*122.1	*126.2	*145.1	153.3	158.8	159.4	0
Materials component	139.3	149.5	164.0	164.3	172.4	175.8	0.34
Labor component	128.0	144.0	152.5	163.1	174.2	185.6	0.49
Nelson construction index	132.5	146.2	157.2	163.6	173.5	181.7	0.44

*Used in computing the Nelson Index until April 1952. These are slightly different from the average of the Miscellaneous Equipment Items shown above.

Proper Reservoir Evaluation Pays Dividends

. . . in successful secondary recovery

by W. L. Horner

PROPER evaluation of reservoir characteristics means the determination of the amounts of oil and profit obtainable under different possible methods of operation. Both the engineer and the owner have responsibility in the selection of the plan of operation and whether or not any plan should be adopted.

There are important instances of incorrect decisions having been made because of lack of data available for making the necessary studies. In other instances, incorrect decisions have been made because of incomplete engineering studies as to injection methods. Since the statistical record shows that most fields are being found susceptible to some type of improvement, it is timely to review the importance of data, research, and studies so that correct decisions can be made.

Secondary recovery including pressure maintenance is undergoing an extreme rate of growth. For many years, a large percentage of secondary-recovery operations were in Bradford field, where flooding had long been proved feasible and successful from an engineering standpoint and economic conditions were usually favorable. Paralleling the growth of flooding in Bradford is the extension of flooding in the major areas of Nowata, Okla.; the sandstone fields of eastern Kansas; South Ward, Texas; Louden, Ill.; and others. Now, 275,000 bbl. of oil are produced daily from water-flooding projects in the United States. Approximately 94 million barrels were produced from floods in 1953. The growth is revealed in Fig. 1 which shows a fourfold increase since 1936 when 15 million barrels were produced from water floods. In the last 4 years, waterflood production has tripled.

Oil production from fields receiving water injection, including pressure-maintenance projects and water floods, is three times as much as from water floods alone. Currently fields receiving water injection produce over 850,000 bbl. daily and produced approximately 248 million barrels in 1953, a tenfold growth since 1936 when 20 million barrels were produced. This growth is charted in Fig. 2.

The estimated oil produced from all fields with gas or water-injection projects in the United States is currently about 1,370,000 bbl. daily. Approximately 420 million barrels were produced from such fields in 1953, an eightfold growth since 1936, when approximately 50 million barrels were produced. This rate of growth is illustrated in Fig. 3. Fig. 3 also reveals that the price received per barrel of oil has more than doubled during the same period. Thus, advances in technology cannot be given all the credit for the increase in injection projects.

It is most significant that whereas domestic crude production has not increased during the last 4 years, production from fields with injection projects has made the aforementioned great strides. As of the week ended October

Author is vice president, Core Laboratories, Inc., Dallas. Paper presented at Secondary-Recovery Symposium of North Texas Oil and Gas Association and North Texas section of A.I.M.E., Wichita Falls, November 18, 1954.

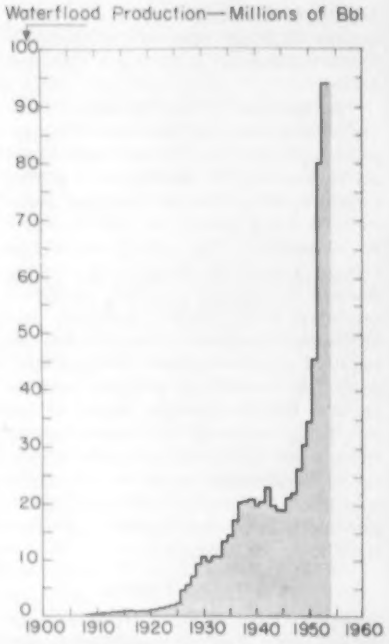


FIG. 1—Annual water-flood production in the United States.

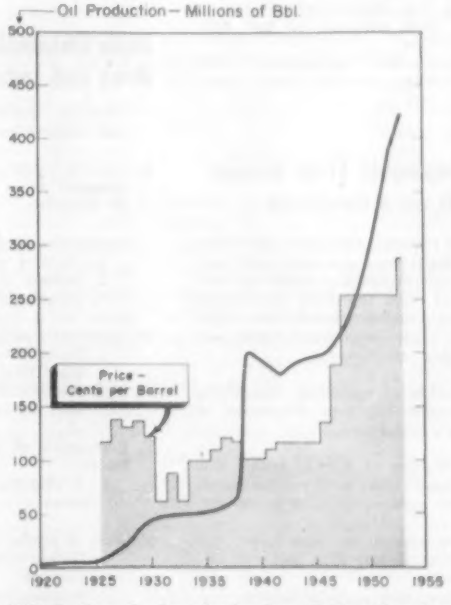


FIG. 2—Growth of production from fields with water-injection projects in the United States. Includes both water flood and pressure maintenance.

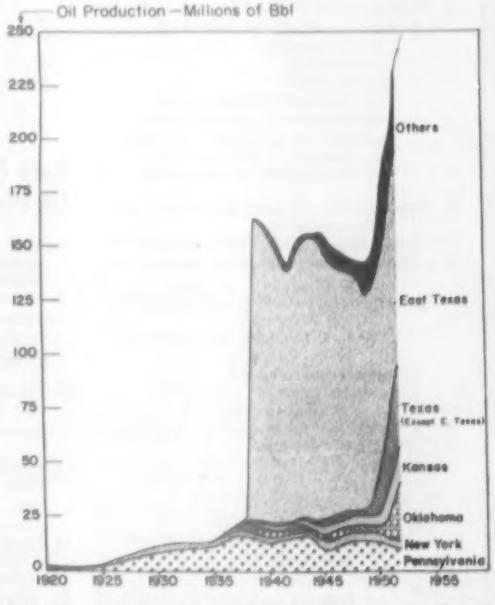


FIG. 3—Average price of Mid-Continent crude oil and annual oil production from fields with fluid-injection projects.

16, 1954, it is estimated that approximately 22.5 per cent of the domestic crude production came from injection fields.

The question of whether or not secondary-recovery methods should be applied is properly one of economics based on engineering. If the expected profits appear to be sufficiently large to justify the risks, the project would normally be undertaken. The rapid recent and current growth of water-flood oil production is evidence of strong economic incentive. It is realized, however, that additional economic incentive will be required as development and operating costs for water-flood projects become greater. Great costs per barrel of oil are being incurred in deeper pools, from pools where less recovery is obtained, and from pools where otherwise more expensive and more complex methods of development and operation must be employed.

Controlling Factors

Writers have recently indicated that the following reservoir conditions would make water flooding "unfavorable": (1) fractures; (2) vuggy limestone porosity; (3) large fracture treatment; (4) presence of gas cap; (5) high viscosity; and (6) extreme shallow depth. To the foregoing list may be added customary general statements which have been made as to the unfavorable influence of high connate water and apparent nonuniformity within the formation. Although each of the aforementioned factors and others are influential to some extent, they are not controlling. The question of degree and of relative importance must be decided by engineering studies of each individual field, as the following comments indicate.

In contrast to customary views on the question of fractures, the following significant statement was submitted before the Texas Railroad Commission at a hearing September 23, 1954: "This confirmation on test cores of the results of the analog study has led to the conclusion that, if the fracture frequency and width are suitable in the reservoir, the Spraberry can be effectively flooded by normal water-flood operations. The only feasible way to determine if these are favorable is by suitable field trial."[2]

Whereas fractures may be considered generally unfavorable, high recoveries are reported by natural water drive in numerous fractured reservoirs, although unfavorable results have been reported in a few instances.

Vuggy porosity is observed to be present in the great majority of reef limestones where natural water drive has obtained high efficiency. It is also observed in others where water injection has indicated good performance to date.

As to the unfavorable view expressed on large fracture treatments, the abstract of a recent A.I.M.E. paper is quoted: "Water-flooding operations in Langston-Kleiner field, Young County, Texas, are described. Widespread application of formation fracturing has been practiced in both producing and injection wells. Field performance data are cited which indicate that there has been no detrimental effect on sweep efficiencies and that probable benefits in injectivity have resulted from the fracture treatments."[3]

The presence of gas caps and high-viscosity oil are among other factors which tend to limit rather than increase the amounts of oil recoverable by water flooding. However, their effects are likewise subject to study, evaluation, and to some extent, correction or compensation.

Connate and injected waters . . . High-connate-water content admittedly reduces the total amount of the reservoir which is available for storage of oil, but in itself is not an unfavorable physical property. One of the large pools in the eastern United States was recommended in publications in 1935 as a favorable water-flooding prospect. However, high-connate-water content

Table 1—Check List for Evaluation of Reservoir Characteristics

Data Obtainable From Individual Wells

A. Description of formation:
   1. Cores—partial and complete:
      (a) Description
      (b) Analysis
   2. Electric logs:
      (a) Qualitative interpretation
      (b) Quantitative interpretation
   3. Radioactivity and other type logs:
      (a) Qualitative interpretation
      (b) Quantitative interpretation

B. Determination of fluid distribution and characteristics:
   1. Production and drill-stem tests:
      (a) Determination of gas-oil contacts
      (b) Determination of oil-water contacts
      (c) Determination of gravity variations
   2. Bottom-hole pressure
   3. Productivity index
   4. Pressure buildup data
   5. Reservoir fluid analysis and behavior:
      (a) Oil
      (b) Gas
      (c) Water
   6. Special laboratory tests:
      (a) Electrical properties of rocks and fluids
      (b) Capillary pressure data
      (c) Relative permeability relationship
      (d) Water-flood susceptibility tests, mobility ratio, breakthrough, characteristics, three-phase conditions
      (e) Gas displacement tests at high pressures or low pressure
      (f) Special displacement tests, CO_2, miscible fluids, heat, etc.

Data Obtainable From Groups Of Wells on a Reservoir

A. Type of reservoir formation and lithological limitations; geological and engineering interpretation available by utilization of data obtained on several wells; e.g., pressure interference tests, injection tests, depositional trends, and compaction conditions.

B. Coordination of collecting, assembling and disseminating data. Formation of operator's committees.

C. Standardization of data to enable uniform comparison and interpretation, logs, core analyses, gas, research, etc.

D. Legal agreement on boundaries and preparation of base map and well elevation data.

E. Volumetric and material-balance estimation of reservoir characteristics and future performance. Comprehensive studies to forecast behavior, design of plans.

Data Obtainable From General Area and Industry

A. Regional characteristics of formation and information on possible aquifer.

B. General range of recovery to be anticipated under one or more methods of operation.

C. Economics of development:
   1. Costs of well site
   2. Drilling costs
   3. Completion costs

D. Economics of production:
   1. Prices obtainable for oil, gas, and other field products
   2. Production costs and costs of possible future capital expenditures

E. Economics of obtaining injection fluids:
   1. Availability and cost of gas or water

F. Rate of production and revenue return:
   1. Nation-wide and local supply and demand
   2. Practices of regulatory bodies in area

was interpreted as an unfavorable factor. This resulted in delaying flooding many years but recent pilot-injection projects in this field have demonstrated flooding to be successful. The presence of high-connate-water content was confirmed by recent research which also disclosed that large recovery could be obtained by water flooding.

Production of large percentages of water is commonly regarded as evidence unfavorable in a water-flooding prospect. The distribution of water production has been found the key to the situation in several cases wherein water encroachment was effective in only portions of the fields and where greater recoveries were observed, whereas the remainder of the fields had less recovery with no evidence of water drive. An interesting example of successful water flooding in a field that had been producing large amounts of water was discussed in a paper on Gaber pool, Kansas.

The Check List

A check list of the data useful in evaluating reservoir characteristics for secondary recovery is submitted in Table 1. A full discussion of the uses of these data is far beyond the scope of this report. It is desirable to emphasize that practically all available knowledge and experience in reservoir engineering may be applied usefully in secondary recovery.

Data from individual wells . . . Detailed reservoir studies can be made when sufficient data are available to determine the saturation conditions within the reservoir. Studies of reservoir performance data and data obtained from well samples are required to indicate the present distribution of oil throughout the reservoir. Distribution is affected by the production mechanism which may be influenced by gravity drainage or water encroachment, either of which would be unfavorable factors at least in portions of the field.

Zones cored and logged should include the entire effective section starting with formations immediately above the pay zone. This is needed to obtain data on possible fractures or permeability in shale layers and other data applicable to the mechanical problems of drilling, water supply, and completion. Coring and logging should continue through the base of the oil zone and into the underlying formation enough to determine its possible influence on the project.

Depending upon the result of the permeability, porosity, and saturation determinations, certain wells can be selected for special tests to determine fluid content, injection characteristics, and other pertinent factors.

Core-analysis procedure should be selected to obtain a uniform quantitative record of the variations in pore-size distribution, connate water, relative permeability characteristics, susceptibility of water flooding, and other important factors.

Pilot floods can be wrong . . . Valuable data can be obtained from pilot-injection operations. However, the use of small pilot-flood yields data that are unreliable and difficult to interpret. The theory of using pilot floods is to demonstrate the effects of a large number of variables at one time. Therefore, the pilot flood covering a large portion of a field is obviously more representative that a pilot flood covering a small portion. Even within a given area of a field, the use of a pilot as small as a five-spot is known to have limitations.

"The problem of using pilot-flood data as a guide in predicting oil recovery per acre for a field-wide flood is to know how much, if any, oil migrates out of the pilot area."[4] The authors conclude the recent paper quoted above by stating that performance of the flood in an idealized system "can be predicted, using appropriate rock and fluid characteristics together with experimentally determined correlations, by a modification of the Buckley and Leverett frontal-drive equation."

By comparison, they also state that the oil-recovery possibilities can be evaluated from a pilot, "provided production of the inside producer is not restricted by well damage, proration, equipment limitations, etc., and the rate of advance of water from each of the injection wells is the same."

Because of inherent limitations, the pilot would therefore be expected to indicate a sample of the minimum per acre-foot recovery. Valuable data as to injection pressures and leakage possibilities would be obtained promptly from simple injection tests.

Factors outside reservoir . . . The influence of the price received by the producer for each barrel of oil is obviously of greatest importance. Of equal importance is the amount of market available. The constructive conservation policies of our regulatory authorities have contributed as much as any factor to the growth of injection projects.

Also of equal importance is the question of cooperation between owners of production. Estimates of recovery by water flooding even with favorable economic factors must be reduced substantially if cooperation between owners is not obtainable. The cooperation is usually obtained in the form of agreements on the drilling of injection wells along lease lines or as to a pattern of staggered injection wells to control net drainage, or in unitization. From a geological and engineering standpoint, the plan of operation to obtain maximum recovery would be independent of property lines but would depend upon reservoir conditions.

Cooperation toward obtaining water and gas supplies has been one of the decisive factors in a number of large successful projects.

Costs of Obtaining Sufficient Information Versus Results

A practical question often met by oil operators is whether or not to obtain additional information and to authorize expenditures for making certain engineering studies. Although the total cost of formation data is a relatively small percentage of development costs, studies are usually justified in order to avoid unnecessary expenditures. Reports are available on few, if any, oil and gas fields where too much money and time were spent in obtaining data on reservoir characteristics. As demonstrated above, generalizations as to the effect of various factors should be avoided in considering plans of operation. It is also necessary to have sufficient data and to make engineering studies of each individual pool to determine the most applicable method of increasing recovery.

An inherent difficulty would be avoided if fields could be drilled on wide spacing to start with, with subsequent infilled drilling. By obtaining full and complete information on each of the early wells, guidance would be available to control the coring and logging programs of additional wells. The trend in water-flooding operations has, however, been toward obtaining more information per well rather than less, even though wells are drilled on relatively close spacing.

Measurements of variables such as porosity are important, and the variations are not subject to rigid formulas because the variations depend on the geologic nature of the reservoir. Hence, from a practical standpoint, sufficient data can be obtained only at the risk of obtaining a certain amount of excess information during the course of development.

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3. Roark, Gene E., and Lindner, Jr., J. D., Effects of Extensive Well Fracturing on a Water-Flood Operation in the North Texas Strawn Sand, Pet. Branch, A.I.M.E. fall meeting, San Antonio (1954).
4. Craig, Jr., F. F., Geffen, T. M., Morse, R. A., Oil-Recovery Performance of Pattern Gas or Water-Injection Operations From Model Tests, Pet. Branch, A.I.M.E. fall meeting, San Antonio (1954).

FIG. 1—(Left) The high-resolution seismograph was originally designed as a portable unit.

FIG. 2—Photo at left below demonstrates the simplicity of loading the camera; at right, the convenience of developing in the field.

New portable exploration equipment

High Resolution Reflection Seismograph

Problems which might be solved by the system: small features; detailed or general coverage of larger features at medium depth; geological engineering work, such as dam foundations.

by Robert W. Olson

A NEW type of exploration seismograph equipment, called the High Resolution or "HR" System, has recently been introduced to the petroleum and mining industries.

The system was originally designed to record very shallow reflections from about 50 ft. to about 2,500 ft. This implies a record length of approximately ½ second. Most surprising, however, is the depth from which reflections have been obtained. It is not at all uncommon to have useful seismic information appearing as late as 2 seconds which corresponds, roughly, to a depth of 10,000 ft.

Author is president, Houston Technical Laboratories, Houston.

The system has been tested by "shooting" in a wide variety of places, ranging from the Gulf Coast to Canada. In all of the places tested encouraging results have been obtained.

Early results favorable . . . In a system so new—the first one was delivered in June 1954—it is obvious that there will be no great mass of interpretational data. However, as there are now a dozen sets in operation, there are several places in which a coherent program has been carried out. Invariably the intriguing possibilities of the system have been such that the users have wanted to experiment further in various locations so as to get a better feeling for its capabilities. There have been spot checks with this system, that is, a few profiles shot, in very many areas. In general, the HR system gives a clear "picture book" type of record, usually much cleaner in appearance than conventional seismograph records. Not infrequently it succeeds in getting records in places where conventional systems fail.

It is by now well established that reflection events can be obtained from

depths as shallow as .02 or .03 second. It is fairly well established that small features, that is, thin sands and the like, which do not show on conventional lower-frequency reflection seismographs, can be displayed with the HR system.

Usable deep data . . . There is theoretical reason for believing that reflections may be obtained in the higher-frequency spectrum which would not show at all on the lower-frequency seismographs, due as much to the low-frequency noise present as to the fact that the feature itself might not be large enough to cause appreciable reflected energy at those frequencies. In addition, with the high sensitivity, it is apparent that good fairly deep data can be obtained.

A wide variety of problems which might be solved by the system will immediately suggest themselves to the practicing geophysicist in the following very general classes:

1. Small features.
2. Detailed (or general) coverage of larger features at medium depth.
3. Geological engineering work, such as dam foundations.

The complete portable system, ready for the field, is shown in Fig. 1. The HR system was originally designed for Kennecott Copper Corp., and the first unit was delivered to that firm in June 1954. The particular piece of equipment was designed at the instigation of Ralph C. Holmer, chief geophysicist.

It is a twelve-channel system designed originally for detailing small and shallow structures, such as might be expected in mining. The name High Resolution seems particularly appropriate since there is ample reason to believe that some features that were not resolved by a conventional reflection seismograph can be mapped with the HR. Fig. 3 shows two records made in the Houston area. Fig. 3a is a conventional record taken with a low-cut filter normally considered optimum for the area under investigation but recorded on the high-speed camera of the HR system with the paper traveling at 30 in. per second. Fig. 3b is a record taken with a minimum of 90 c.p.s. on the low-cut side of the pass band of the HR system and recorded on the same camera. It may be noted that the reflection at .4 second which is barely workable on the conventional record is clearly resolved into separate events when energy of frequency less than 90 c.p.s. is attenuated and that over 90 c.p.s. recorded. It is thought that the two reflections originate at the top and bottom of a thin stratum.

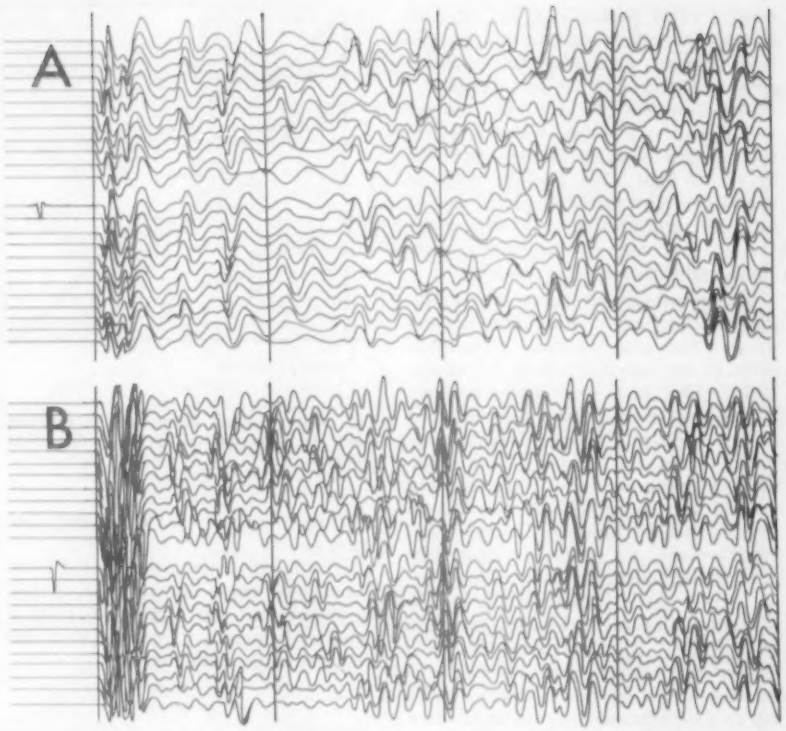

FIG. 3—Record A is a conventional record taken with the new instrument; B is taken with a minimum of 90 cycles per second on the low-cut side of the pass band of the H.R. system. Note the clarity of the reflections on B.

Principle . . . The basic concept in the design of the system comes from a physical principle that the lower limit to the size of an object which may be "seen" by various physical systems is a function of the frequency of the radiation with which the object is "illumi-

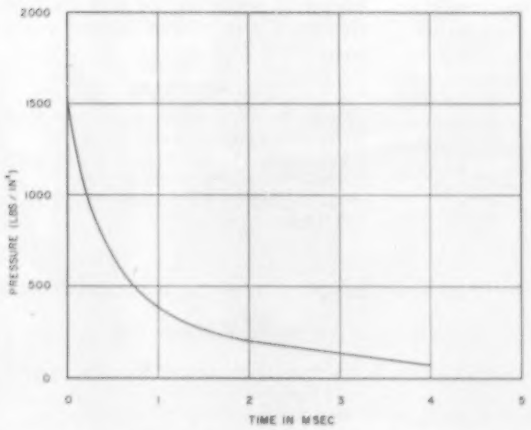

FIG. 4—The variation of pressure with time at a location in close proximity to the charge.

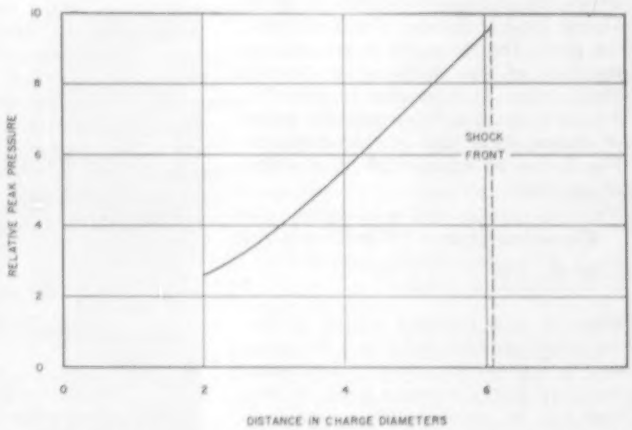

FIG. 5—The instantaneous pressure in a viscous fluid at different distances from the shot.

nated." This principle is of value in microscopy where electron microscopes have greatly extended the resolving power of conventional microscopy by illuminating the object to be resolved with a beam of electrons whose effective wave length is much smaller than that of visible light. The analogy holds in acoustics where the principle is applied to sonar, and also in radar where the use of very high frequencies enables considerable detail to be resolved.

The possibility of using higher frequencies for better resolution in seismic surveys had aroused some speculation prior to the introduction of this equipment. The fact that high-frequency components exist in the pulse produced by an exploding charge is quite apparent from an examination of the pressure pulse propagated through the ground near the explosion. (See Sharpe 1942). Allen, Lombardi, and Wells (1952) made use of higher than conventional frequencies when conducting an experimental reflection survey in Minnesota where they were mapping the glacial drift-bedrock interface. Pakiser and Mabey (1954), of the U. S. Geological Survey, were able to make use of a high-frequency pass band when mapping shallow limestone and dolomite beds in Oklahoma and Kansas.

Theory . . . The use of high frequencies in seismic exploration depends on the utilization of the higher-frequency components existing in the pressure pulse originating from an exploding charge. Fig. 4 shows the variation of pressure with time at a location in close proximity to the charge. It should be noted that the rise to maximum pressure takes place almost instantaneously after the firing of the charge. In this particular case the shot was fired in a viscous fluid and the pressure was measured with a Hilliar gage. The weight of the charge was 300 lb. and the separation of shot and gage was 50 ft. Fig. 5 shows the instantaneous pressure in a viscous fluid at different distances from the shot. The steep rise in pressure at the face of the shock wave can be clearly seen. It is possible to show by Fourier's theorem that a pressure pulse of similar shape such as that shown in Fig. 6 can be represented by a series of the form:

$$P(t) = A(s \text{ in } nt + \tfrac{1}{2} \sin 2\,nt + \tfrac{1}{3} \sin 3\,nt + \ldots 1/r \sin rnt + \ldots)$$

where A is a constant related to the maximum pressure and P(t) is the pressure at a point at a time t. It is seen therefore that a pressure pulse of this type can be resolved into a series of sinusoidal waves of increasing frequency, but with amplitude decreasing

FIG. 6—A pressure pulse such as this can easily be represented by a mathematical equation.

in proportion to the increasing frequency.

In addition, if we can treat the earth as behaving like a viscous fluid, it may be shown that the amplitude Y of a signal at a distance x from the shot will conform to the relationship

$$Y = Y_o / e^b$$

where Y_o is the amplitude at distance $x = o$

k is a constant

f is the frequency of the propagated wave

$b = kf^2 x$

It is seen therefore that for increasing frequency the attenuation of the signal with distance from the shot point becomes very severe.

Both the above factors make it apparent that, at a distance from the shot, the high-frequency energy is small compared with that transmitted at lower frequencies. Because of this, it was apparent that the HR system would need great sensitivity, and the system was designed so that background noise would always be the limiting condition.

Because of the short duration of a seismic "event" recorded at high frequencies, a very fast automatic gain control was incorporated in the HR system. This introduced a problem as there is an empirical relationship between the rate at which the automatic gain control can vary the gain of an amplifier, and the minimum low-frequency response of the system. As it was considered that a very fast automatic gain control was essential and that the low-frequency response was relatively less important the minimum cut off was raised to 30 c.p.s. In addition the camera speed was raised to 30 in. per second, thus enabling a record to be timed with considerably greater accuracy than a conventional seismogram.

Amplifiers . . . The system includes two HR amplifier banks mounted in aluminum cases. Each bank contains six HR amplifier channels with their associated filter channels, input channels, and test and control channels.

Recording oscillograph . . . Paper speed is 30 in. per second and timing line intervals are .005, .01, and 0.1 seconds. An interlock circuit with the blaster is provided for remote starting control. A 24-trace galvanometer block is supplied for simultaneous "mixed" and "unmixed" recording of 12 traces. The natural frequency of the galvanometers is 500 c.p.s.

Power supply . . . Power supply for the HR system is a portable power pack containing a 12-volt A-battery and a 90-volt B-battery. Batteries are of the rechargeable lead-acid type.

Conclusion.

This article has run to analogs. It might be appropriate to suggest one other. In the very early days of radio, only the low frequencies were used; the high frequencies were thought to be useless. After a little very cautious experimenting in the high-frequency (short-wave) regions, it was discovered that they had some truly amazing properties and very quickly that end of the spectrum was exploited to a very marked extent. It is possible that we have been neglecting too long the high-frequency end of the seismic energy spectrum.

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"The basic concept in the design of the High Resolution system comes from a physical principle that the lower limit to the size of an object which may be 'seen' by various physical systems is a function of the frequency of the radiation with which the object is 'illuminated'."

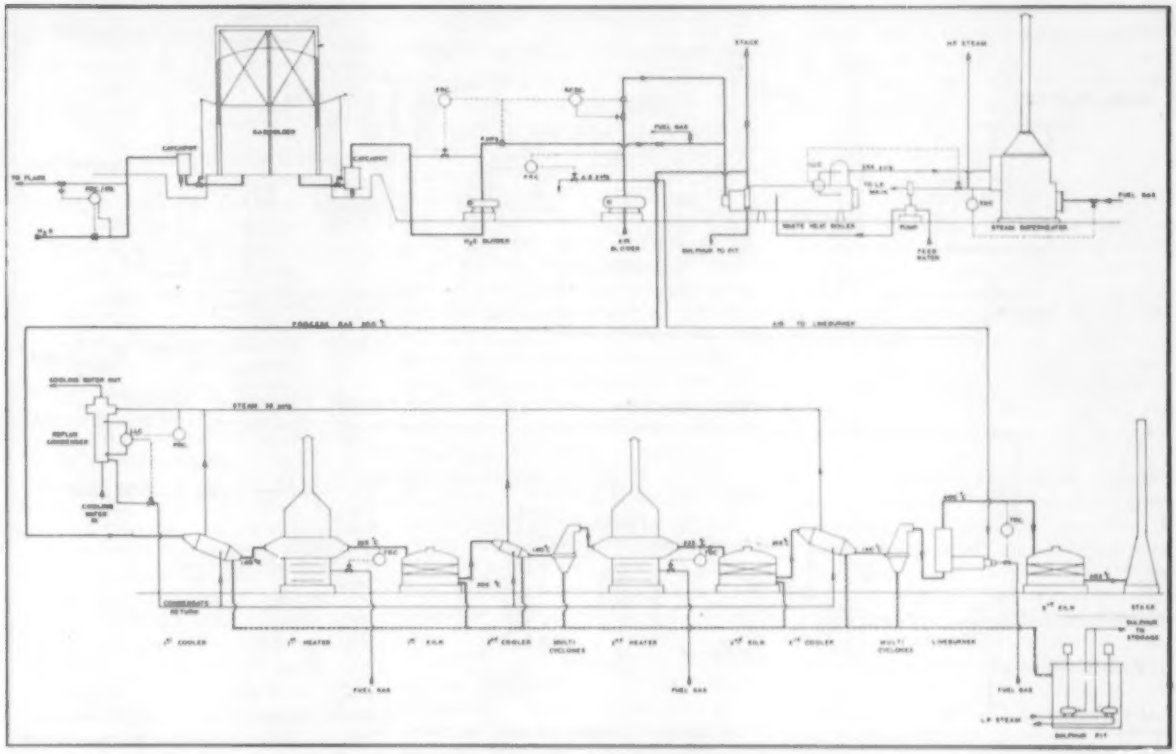


Fig. 1—Diagram of Shell's sulfur-recovery process at Stanlow.

Here's the "how" and "where" of . . .

Sulfur and H_2SO_4 Production in England

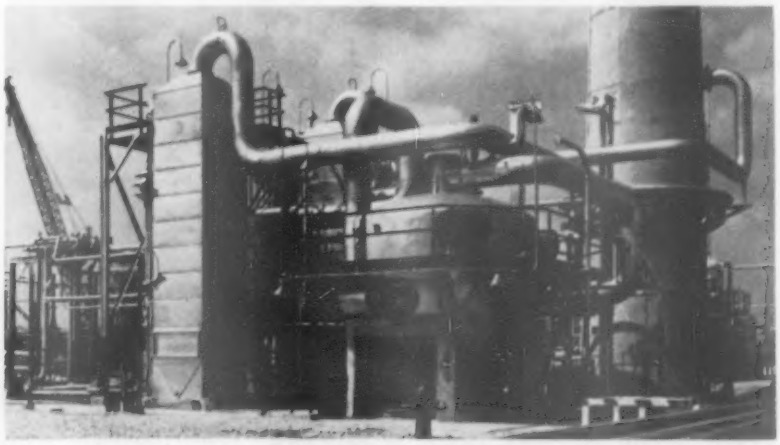
SEVERAL United Kingdom oil and natural-gas processors have lately begun sulfur production, and occasionally H_2SO_4 manufacturing, as an adjunct to their routine hydrocarbon operations for three reasons:

1. The high sulfur content of many crudes.

2. Acute shortage of supplies of this key element following World War II.

3. The effluent-disposal problems closely linked with well-established techniques of sulfur removal from, and H_2SO_4 treatment of, petroleum and petrochemical products.

Extraction of elemental sulfur gas has assumed great importance on two additional grounds. Britain produces no brimstone and only limited quantities of pyrites. Moreover, she imports the bulk of this basic commodity from the United States entailing substantial dollar outlay.



SULFUR RECOVERY is achieved in this plant at Esso's Fawley refinery.

Claus process . . . The sulfur-recovery process is based on the technique of Carl Friedrich Claus of London who secured a British patent in 1882 and United States patents 4 years later. His process comprised the catalytic reaction of air with H_2S at elevated temperatures, and was highly exothermic.

As a result the earlier Claus installations were circumscribed by their ability to dissipate heat rapidly. In the early thirties of the current century the I. G. Farben technicians modified this process and so rendered it economically more attractive.

At the present time approximately 95 per cent of all crudes refined in the United Kingdom come from the Middle East, and the sulfur contents of Kuwait, Iraq, and Arab crudes are 2.5, 1.9, and 1.5 per cent respectively. In Britain current combined catalytic ca-

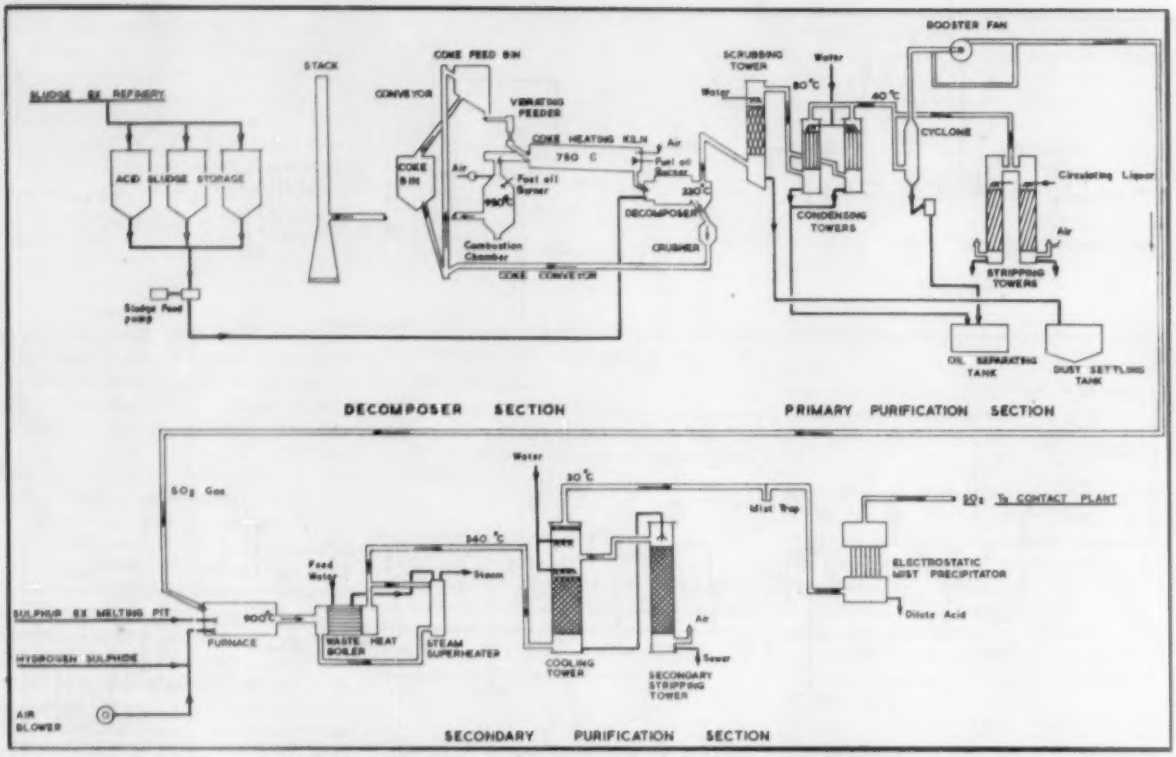


Fig. 2—Flow diagram of the low-temperature sludge decomposer at Stanlow.

pacity of the refineries is of the order of 109,000 bbl. per day, and the potential sulfur which can be recovered from the H_2S evolved in these installations alone amounts to 45,000 tons per year.

The oxidation of H_2S to sulfur by burning with oxygen may be represented thus:

$$H_2S + 1\frac{1}{2}\ O_2 = H_2O + SO_2 + 124\ \text{K. calories} \quad (1)$$

$$2H_2S + SO_2 = 2H_2O + 3S + 25\ \text{K. calories} \quad (2)$$

$$3H_2S + 1\frac{1}{2}\ O_2 = 3H_2O + 3S + 149\ \text{K. calories} \quad (3)$$

In modern units reactions (1) and (3) occur in the boiler, while reaction (2) occurs mainly in the catalyst beds.

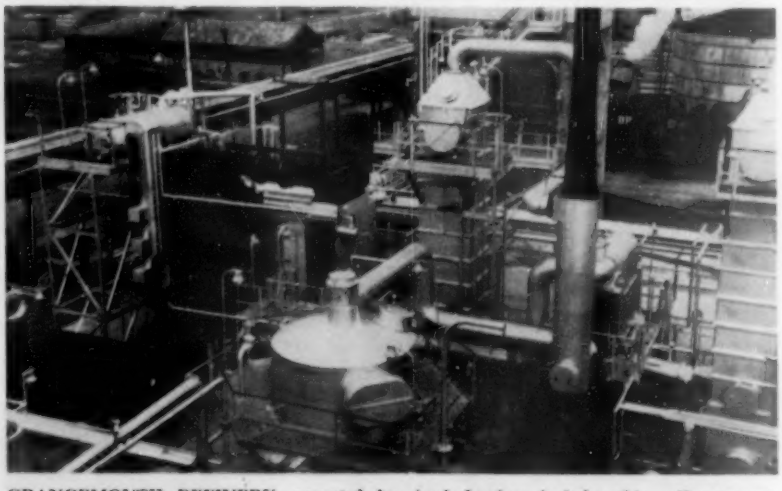
Stanlow Unit

A simplified flow sheet of the sulfur-recovery unit at Stanlow is given in Fig. 1. In this plant an H_2S gas holder has been provided since it gives a greater degree of operating flexibility by tending to dampen out variations in feed rate and composition, and allowing more time for emergency action than would be possible with a direct feed line between the Girbotol plant and Claus unit.

A top limit trip on the gas holder shuts off the H_2S supply should the holder reach the top limit of its travel, when the supply is automatically diverted to flare via a pressure controller. Should the gas holder reach its lower limit of travel the gas suction line to the Claus plant H_2S blower is shut off. A blower delivers H_2S at about 4 psig. (at full load) and under flow control to the burner at the waste-heat boiler. A second similar blower supplies combustion air at a controlled pressure and a rate regulated by a ratio flow controller reset from the H_2S flow controller.

The combustion gases from the burner are cooled to about 300° C. in the waste-heat boiler, which is of the fire-tube type and inclined to allow condensed sulfur to be drained to a seal pot and out to a storage pit. The exit gas pressure is around 1.2 psig. Steam is generated at 206 psig. The sulfur recovered from the waste-heat boiler is approximately 29 per cent of the total.

The process gases are further cooled in the low-pressure steam generator (38 psig.) to 138° to 140° C. This is



GRANGEMOUTH REFINERY, operated by Anglo-Iranian, includes this sulfur-recovery plant that handles sulfur extracted by the Girbotol unit.

also tilted to allow sulfur drainage. From this cooler approximately another 22 per cent of the sulfur is recovered, thus bringing the total to 51 per cent up to this stage.

Converters . . . The gases are then reheated to 225°C. in an in-line burner, equipped to burn fuel gas or H_2S with air, the air-gas mixture being carefully controlled to avoid upsetting H_2S-SO_2 ratio in the main stream. From the in-line burner the reheated gas enters the first kiln, which is a firebrick-lined steel vessel containing 635 cu. ft. of red French bauxite supported on a firebrick floor dividing the chamber in halves. The gases enter the kiln at the top, and the lower section has a sloping floor for sulfur drainage.

The top surface of the catalyst is covered with broken firebrick to act as a soot filter as well as absorb violent temperature fluctuations. The space velocity is about 100 cu. ft. of H_2S per hour per cubic foot of catalyst, and the gases leave the kiln at nearly 300° C. Sulfur removed from the kiln pot is about 1.5 per cent of the total.

Cooling of the gas stream is again accomplished in a low-pressure steam generator from which about 19 per cent of the total sulfur is recovered, bringing the total recovery at this stage to 71.5 per cent. The gas outlet temperature is again 139° C.

Multicyclone units in parallel are used to remove sulfur mist from the process gas leaving the coolers. The sulfur (about 8 per cent of the total recovery from each cyclone unit) is once more drained via seal pots. The subsequent process stage is identical to the last, i.e., an in-line burner, catalyst kiln, cooler and multicyclones, the total sulfur removal in this complete stage being around 14 per cent. The total conversion of H_2S is now 96-97 per cent.

Control tests . . . The Shell Stanlow plant is currently producing 40-50 long tons of sulfur per day, and the operation is smooth and steady. Plant control tests are mainly for H_2S purity and H_2S-SO_2 ratio in the tail gases leaving the last cooler; this ratio should be 2:1; and although it could be checked at any point in the unit, the concentration here is conveniently low.

The catalyst surface temperature in the last kiln is roughly proportional to the amount of H_2S being oxidized and by comparison with the analyses a constant watch on the ratio is kept. Moreover, excessive hydrocarbons in the H_2S feed, which cause poor conversion by upsetting the air-gas ratio, are also detected by a rapid temperature rise in this kiln. Sulfur of higher than 99.9 per cent purity is produced, provided that excessive amounts of hydrocarbons are excluded from the feed.

Acid Sludge Conversion

The oil-refining, as well as the petrochemical, industry employs large quantities of sulfuric acid, resulting in the production of spent acid, acid sludge, or acid tar. The disposal of such acid sludges has constituted a refinery problem for many years especially in areas where regulations preclude the discharge of acid to sewers, and of acid fumes to the atmosphere. Not all the sludges are fit for reuse within the refinery; hence most processing plants have an acid-sludge-disposal problem depending on the multiplicity of operations involving sulfuric acid, and the extent to which the utilization of acid sludge in place of fresh acid is feasible.

A Chemico low-temperature sludge decomposer unit is nearing completion at the Shell Stanlow refinery. A flow diagram of this installation is given in Fig. 2. The contact plant has not been included here since it is a standard type of operation.

Sludges from the refinery are stored in the plant feed tanks maintained at around 40° C., and in the case of certain sludges of high-inorganic-matter content provision has been made for their immediate usage since long-term storage will render them unpumpable. Sludge circulation and feeding to the kiln are carried out by steam reciprocating pumps and transfer lines are steam traced.

Decomposer operation . . . The sludge decomposition aspect of the process entails operation of the coke feed bin, coke feeder, coke-heating kiln, sludge-decomposing kiln, and coke-handling equipment. Exit gases from the decomposer are mainly a mixture of SO_2, CO_2, steam, hydrocarbon vapors, and dust; and purification is essential before this stream is fed into the contact plant. This is effected by (1) a gas scrubber, cyclone separator, and oil and dust separating vessels, and (2) an SO_2 furnace, cooling towers, stripping tower, and electrostatic mist precipitator.

Lastly, uncondensable hydrocarbons, derimental to the contact plant, are removed by combustion with excess air in the SO_2 furnace in which liquid sulfur and H_2S can also be burned to furnish SO_2. The transfer of gases throughout the unit is effected by the main blower situated downstream of the drying column on the contact plant.

The contact unit for the recovery of H_2SO_4 from the SO_2 gas stream is of the conventional type wherein the SO_2 stream is dried in a tower by use of 93 per cent acid and then fed to a four-stage converter. Here the SO_2 is converted to SO_3 over a catalyst, and subsequently the absorption of SO_3 is carried out in two towers producing 95 per cent H_2SO_4 and 20 per cent oleum respectively. The only departure from normal practice is the employment of an additional heating stage to compensate for the use of cold gas as feed.

Fawley Unit

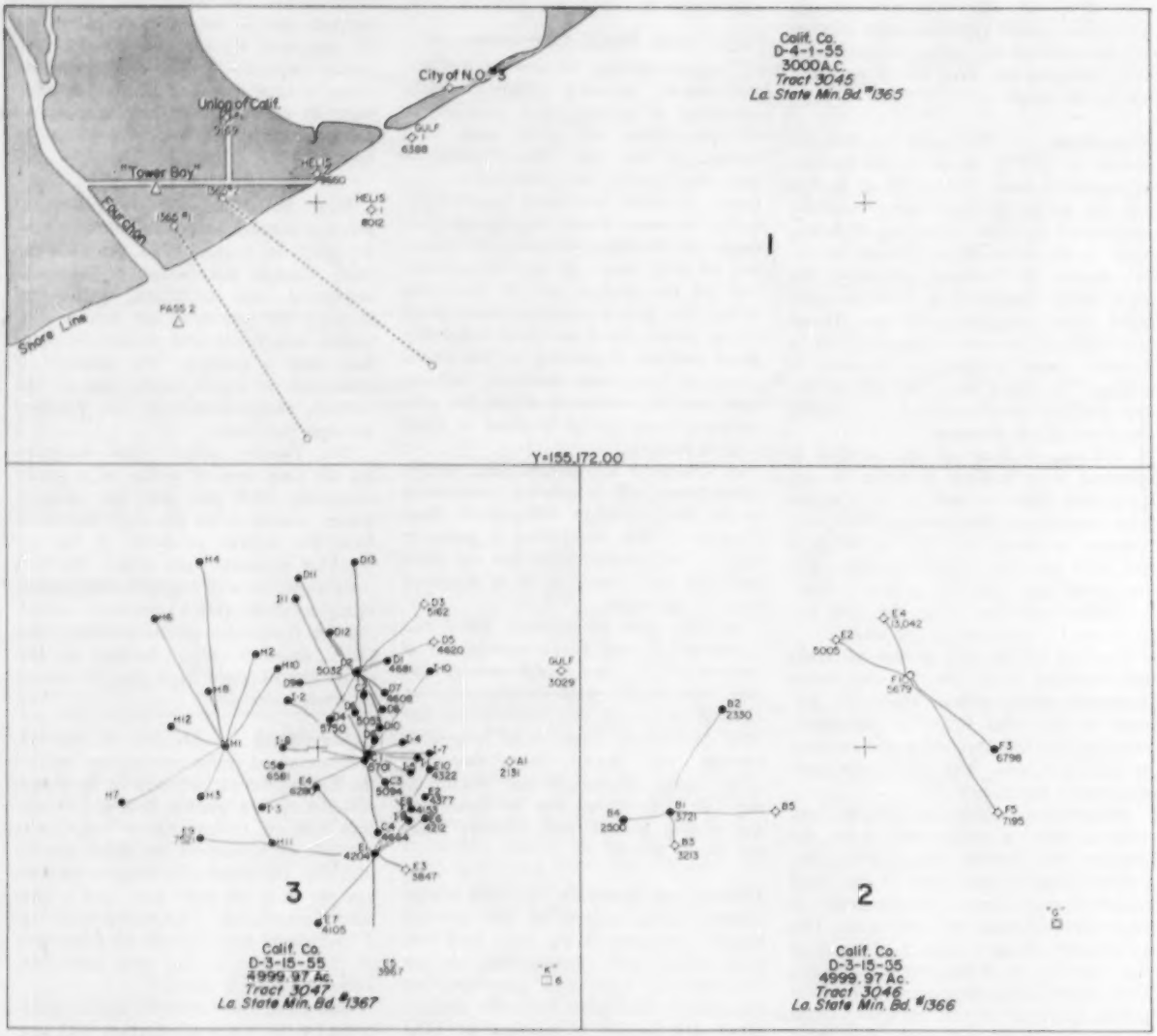
Esso Petroleum Co.'s refinery at Fawley commissioned its sulfur-recovery plant in August 1953. As with the Shell Stanlow installation, H_2S here is converted into elemental sulfur by burning the gas with air under controlled conditions and thence by reaction over a catalyst. The element is produced in liquid form, and at the correct temperature it is pumped through pipelines.

The Fawley sulfur plant accounts for 40 long tons of sulfur of a purity exceeding 99.5 per cent per day. It comes mainly from the H_2S recovered from the lighter products of the cat cracking process, from which the H_2S is removed by washing with diethanolamine solution (DEA) without affecting the remainder of the product. The DEA solution, after boiling to liberate almost pure H_2S gas, is reused to wash more feed.

Grangemouth . . . Thirdly, the recently commissioned sulfur production unit at the Grangemouth refinery in Scotland, completing the plant's postwar expansion scheme, forms one of three units brought on stream in the third quarter of 1954, the other two being a 60,000-ton per year cat poly unit, and a Girbotol installation. The sulfur unit has a maximum capacity of 20 long tons of flake sulfur a day, and now produces 14 tons a day.

Gas from the Girbotol unit is processed by the sulfur-production unit into flake sulfur. H_2S entering the plant is burned with a stoichiometric amount of air, controlled by a ratio flow controller and thence passes through a boiler feed-water heater. It is cooled by scrubbing with molten sulfur, which condenses such element as has been formed in the reactor. The gases are then reheated and pass through a catalyst bed to complete the reaction.

Further cooling takes place in a second boiler feed-water heater and sulfur wash tower. The gases are passed through a furnace to destroy any final traces of H_2S. The resulting molten sulfur overflows from the base of the wash towers into a storage pit, from which it is pumped on to flaking machines mounted on top of storage hoppers. From these it is transported by road to the H_2SO_4 plant at Broxburn works, one of the shale-retorting plants operated by Scottish Oils, a subsidiary of A.I.O.C., where acid was previously produced by the lead chamber process.



DIRECTIONAL DRILLING is becoming a routine procedure in developing the offshore fields. The above map shows how this is accomplished at Bay Marchand where as many as 13 wells have been drilled from the same platform.

Calco plans 16 wells for Bay Marchand

Biggest Offshore Field to Get Bigger

by William P. Sterne
Gulf Coast District Editor

BAY MARCHAND, already the largest offshore oil field, is going to get bigger. The California Co., which has produced in excess of 10,000,000 bbl. from the LaFourche Parish field since its discovery in 1949, plans to drill 16 more development wells in the near future, to prove up additional reserves.

One of the first tidelands "finds," Calco hit Bay Marchand in the early stage of the offshore-drilling activity. The field lies on the flanks of the world's largest salt dome, a dome which is estimated to contain as much as 56 cubic miles of salt in its huge structure underlying the field.

Two offshore platforms are now being fabricated in Louisiana shipyards, and are to be towed to location and installed soon. Included is (1) a template structure designed to handle 10 wells, with drilling to be done by two rigs simultaneously, as has been the practice at Bay Marchand; and (2) a unique multiple-well derrick platform, which can accommodate six wells, and on which is located a rig which can drill six holes without being skidded.

Fifty wells . . . Bay Marchand, an all-electrified field, already contains 50 producing wells, 21 of which were

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drilled during the past 12 months. There are 25 pay sands in the field, and of the 50 successful wells, 45 of them have been drilled directionally to tap the sands which dip away from the dome.

The current production allowable, cut 40 per cent over the past 18-month period, is 7,800 bbl. daily. However, the field is capable of producing in excess of 10,000 bbl. daily, and it is hoped that a more favorable supply-demand situation might permit greater output in the future.

Cumulative production at Bay Marchand up to August 31 totaled 10,121,810 bbl. Gravity of the oil averages 33° A.P.I.

Part of the new drilling program is designed to prove additional reserves on the north flank of the dome (the most prolific production has been from the west flank).

Nine platforms . . . As of November 1 there were nine offshore platforms in Bay Marchand field (the field is not in a bay at all, but lies in the open gulf. It gets its name from a shallow bay that has since been eroded into the Gulf of Mexico). These platforms are connected by gathering lines, and production is moved to shore through coated-and-wrapped submarine pipe lines, directly to storage on shore, 2 to 3 miles away. Oil is sold to Gulf Refining Co., which moves it via pipeline to the Mississippi River area.

Electrified facilities . . . Bay Marchand is a completely electrified operation. Its power source comes from a local electric company on shore. A 15,000-volt submarine cable was laid from the shore to the various platforms, and even the rotary rigs which drill the development wells use electricity. (A wildcat now drilling, however, is being put down with a diesel.)

In case of power failures (and there have been some) standby steam pumps, powered by natural gas, pump the oil production to the storage facilities on shore; and, standby d.c. motors fed by electricity from the generators on the LST drilling tenders can be tied in to the draw works, thus furnishing power to keep drill pipe moving in any emergency to avoid getting stuck in the hole while drilling directional holes.

Telephone lines are contained in the submarine cable and engineers and production people can talk to any other structure from any structure they might be on at the time. The 'phone system is also tied into a two-way radio setup with the base camp at Leeville, and the boats as an aid to communication.

Automatic production . . . All production facilities are electrically or pneumatically operated and are automatic in operation. Should equipment malfunction, valves on the various wells close automatically, being controlled by various safety devices on the production facilities. Wells must be manually opened. The gathering pumps on the platform are controlled by the fluid level in the separators.

The two rotary rigs now drilling development wells in the field are owned by Noble Drilling Co., which has done most of the Bay Marchand drilling to date. They tap onto the 15,000-volt line for their power source, and it has been estimated by Calco engineers that the drilling power load bill runs only about $2,300 per month, or a little less than $40 per day for each rig.

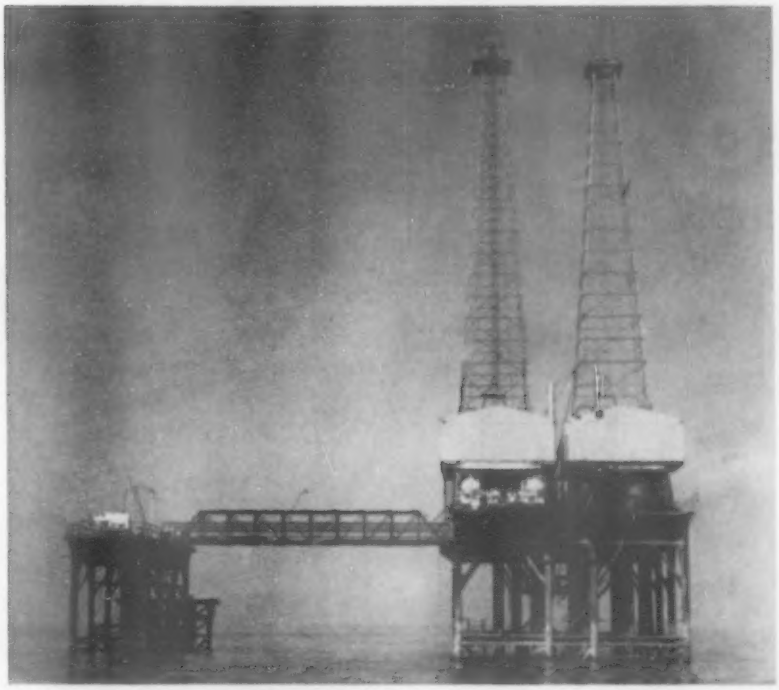
As already stated, standby auxiliary equipment is capable of coping with emergencies during power failures. This was demonstrated graphically recently when current from the substation on shore was cut off for a period of 4 hours. This occurred during the drilling of a directional hole, which was then bottomed at 3,400 ft. The pipe was kept moving with auxiliary electric power generated on the LSTs.

PRODUCTION PLATFORM at Bay Marchand. An electric wireline unit is mounted on a swivel on each platform for cleanout work. Flow lines connect the platforms and move the oil to shore.

WILDCAT DRILLING at Bay Marchand reached a depth of 14,500 ft. in early November. The wildcatters were looking for an overhang of the big salt dome, but the drilling proved unproductive.

Flow lines . . . Four-inch gathering lines connect the various offshore structures. They funnel through the "D" and "A" structures, thence to shore. Conventional separators located on each structure remove the gas from the oil. The gas produced, of insignificant amounts, is either used in a gas-lift program or is flared.

Gas lift . . . Production decline on 10 wells in the field has necessitated the use of a gas-lift program, which now operates at 400 psi. to push the oil to the surface. However, it is soon to be boosted to 700 psi. with the installation of a new compressor to be added short-



THESE TWO electric drilling rigs are mounted on one structure at Bay Marchand to speed up drilling of directional wells. These are being operated by Noble Drilling Co. of Tulsa.

ly. Not only will this step up the flow of oil, but it will utilize more of the gas which is now being flared.

Water line . . . Considerable storage is located on shore, and included is a tank which holds 10,000 bbl. of drilling water. This water is barged down Bayou LaFourche and, being stored, is then pumped out to the drilling platforms through an underwater line.

Wave research . . . As an incidental operation at Bay Marchand, wave-force studies are being conducted from one of the platforms. Methods are being studied to be used in determining the best means of protecting offshore structures from high waves, currents, and salt-water corrosion.

Pay sands . . . The 25 different pay sands found on the flanks of the Bay Marchand salt dome are encountered at 1,200, 1,500, 1,800, 2,250, 2,350, 2,700, 2,750, 2,800, 3,000, 3,100, 3,200, 3,400, 3,550, 3,700, 3,900, 4,000, 4,100, 4,200, 4,400, 4,450, 4,475, 4,525, 4,600, 4,800, and 5,700 ft. The 3,900-ft. zone has produced a total of 1,329,000 bbl. of oil to August 1. The 4,600-ft. zone, the most prolific, has produced 3,000,000 bbl.; and the 4,800-ft. zone has produced 1,800,000 bbl.

Wildcat misses . . . A wildcat which had reached a total measured depth of 14,500 ft. and a vertical depth of 13,500 ft. early in November apparently missed in finding an expected overhang on the east side of the salt dome. A small show was encountered at approximately 6,500 ft., but there were no indications that the suspected overhang exists. It was to be "kicked out" farther in order to prove or disprove the contention.

Beach wells . . . In addition to the wildcat, there is a directional hole being drilled from the beach north of the field. Another directional hole was drilled from this beach and completed in September, flowing its allowable. This test proved the need for the new 10-well platform, and extended production limits of the field to the north.

Drilling techniques . . . Due to a high-pressure gas sand near the surface in many areas of Bay Marchand field, Calco has made it a practice to cement clear to the surface on all its coring strings. It actually gets cement returns on circulating. Calco sets DV collars and 7-in. string, and all wells are completed with sleeve-type gas-lift mandrils. Two-stage gravel packing is used on all wells to combat their sanding up.

All wells are spudded in with 11-lb. mud, and 24-in. conductor pipe is driven to 200 ft. This is followed by 16-in. set at 350 ft.; 10¾-in. to 1,500 ft. vertical; and 7-in. production string run to the bottom of the producing sand.

Electric wire-line units have been installed on each of the producing platforms. Mounted on swivels, they can serve all wells on each platform. Wireline operators and helpers constantly have to clean out paraffin and break up small sand bridges which, in spite of the two-stage gravel packing, attempt to plug up the producing wells. Each well gets weekly attention.

Field History

Structural information obtained on Bay Marchand, indicating it to be the world's biggest salt dome, was obtained several years ago. Presence of the dome was first discovered back in 1927 by a refraction-seismograph survey. An unsuccessful test was drilled on the shore, to a total depth of 6,380 ft. in 1930 as a result of this survey.

In subsequent years, nine more wildcats were drilled around the dome, resulting in eight failures. All but one of the wells are located onshore.

In 1947 Calco became interested in the area as a result of offshore reflection-seismograph work.

Leased in 1948 . . . A year later, on February 17, 1948, Calco leased an area of 13,000 acres, paying the State of Louisiana approximately $1,000,000. Three drilling platforms were immediately erected, and drilling began.

Dry hole . . . The first test resulted in a dry hole, but it landed right on top of the salt dome, as was planned. This hole helped to correlate subsurface study, and initial wells on both of the other platforms hit pay sands.

The discovery well was brought in on March 3, 1949, with pay at 2,873-92 ft. The test was about 2½ miles offshore from the mouth of Bayou LaFourche, in LaFourche Parish.

By January 1950, 10 oil producers had been completed in the field, plus two dry holes drilled.

Contract work . . . Loffland Bros. Co. of Tulsa has been awarded contract to operate the new multiple-well derrick which will be installed shortly. Six wells will be drilled from this platform, using a novel rig designed by Calco engineers and built by Lee C. Moore, Inc. It drills six wells, three wells in each of two rows, without the rig being skidded. Calco is using a similar rig at Main Pass Block 69 field near the mouth of the Mississippi River off Plaquamines Parish *(The Oil and Gas Journal, January 18, 1954, pp. 79-89).*

In charge . . . Calco maintains a modern base at Leeville, La., which houses company district headquarters, radio facilities, and housing for employes.

Harry Dupre is area superintendent, and Max Sheppard is production foreman. Frank Jacobs is lead construction engineer.

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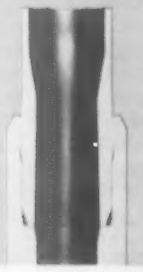

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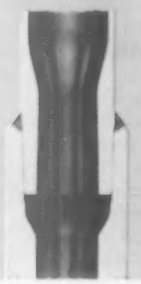
TOOL JOINTS



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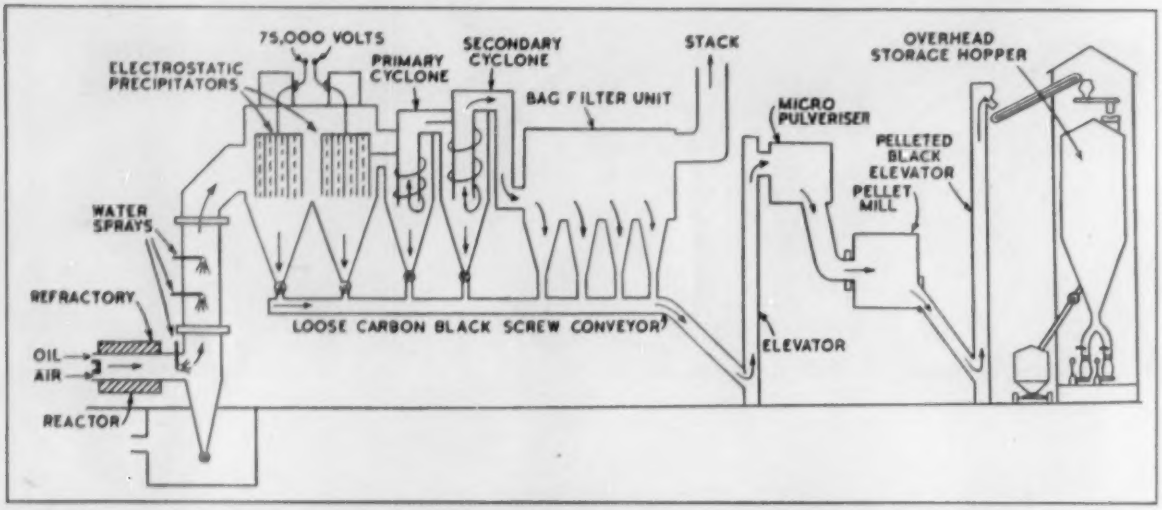


FLOW DIAGRAM of Avonmouth oil-black plant indicating these main steps in processing: (1) partial combustion of oil feed; (2) black separation; and (3) pelletizing.

Here's the status of . . .

England's Carbon-Black Manufacturing

. . . where and how it's made, and who makes it.

THE annual capacity of postwar Britain's carbon-black plants is about 51,000 tons. All these installations make furnace blacks by the combustion of selected fuel oils. The Philblack unit at Avonmouth has an annual capacity of 22,000 tons; the Cabot unit at Ellesmere Port, 18,000 tons; and Port Tennant unit at Swansea, 11,000 tons.

Avonmouth Oil-Black Plant

The carbon-black plant of Philblack, Ltd., is largest of its kind outside the United States. It has the capacity to manufacture 50 million pounds a year. Located in West England, it occupies a 17½-acre site on the Avonmouth Dock Estate adjoining Bristol. It is the outcome of a license agreement signed in July 1948 with Phillips Petroleum Co. of Bartlesville, Okla., who pioneered the development of furnace-oil blacks in the United States. Under this agreement, carbon black made at the Avonmouth plant from petroleum fractions by the Phillips process is identical in character with that manufactured in America.

The capital of the company, close to 6 million dollars, is wholly British, subscribed by the Finance Corporation for Industry (a state agency), Staveley Coal & Iron Co., and private investors. Construction engineers were Head Wrightson Processes, Ltd., supported by 28 subcontractors and suppliers. Of the total cost, inclusive of labor, nearly 90 per cent was spent in Britain.

Products . . . The Avonmouth factory produces two types of furnace blacks—medium-abrasion furnace ("A") black at an annual rate of 20 million pounds, and high-abrasion furnace ("O") type at 30 million pounds a year. The total of 50 million pounds represents an equivalent of about half of the country's current annual intake of carbon blacks.

In Britain, the rubber industry absorbs 93 per cent of the total and the balance goes to a wide range of industries—the most important being paint and ink. This factory's output is reckoned to save several million dollars a year previously paid for imported black.

Raw material . . . This is a special petroleum fraction, of which roughly 70,000 long tons a year is needed to sustain the twin units in full production, comes from the United States. The ideal carbon-black raw material should contain a maximum of aromatics, be low in sulfur, substantially free from suspended ash or carbon, low in molecular-weight resins and asphaltenes, and free of emulsifying water. Possibilities of utilizing domestic coal-tar distillates or oil fractions from refineries are under constant study so as to do away with imported feed stock.

Processing . . . The two grades of black are made in separate units by a process differing only in details. The installation producing Philblack O is the larger of the two. For the Philblack A plant, precipitators, cyclones, etc., are set side by side instead of in line. From the cyclone stage, both plants are housed in a steel-framed building. The process employed consists of burning the special oil fraction with partial exclusion of air and separating the black from the products of combustion.

The feed stock is pumped from the tanker at the dock through a 3½-mile long, 14-in. main into the factory's three principal storage tanks, each having a capacity of 8,000 tons. From these it is pumped into a day tank. The daily raw-material requirements are pumped from this reservoir through the pump house into the furnaces. The feed stock is vaporized in an oil-fired preheater, and passes through to horizontal-cylindrical reactors together with a separately controlled supply of air emerging from three interconnected centrifugal blowers coupled to 550-hp., high-tension motors installed at the pump house and connected to a common manifold.

Reactor . . . This is a steel shell 5 ft. in diameter and 15 ft. high, lined internally with refractory and insulating material. The temperature inside the

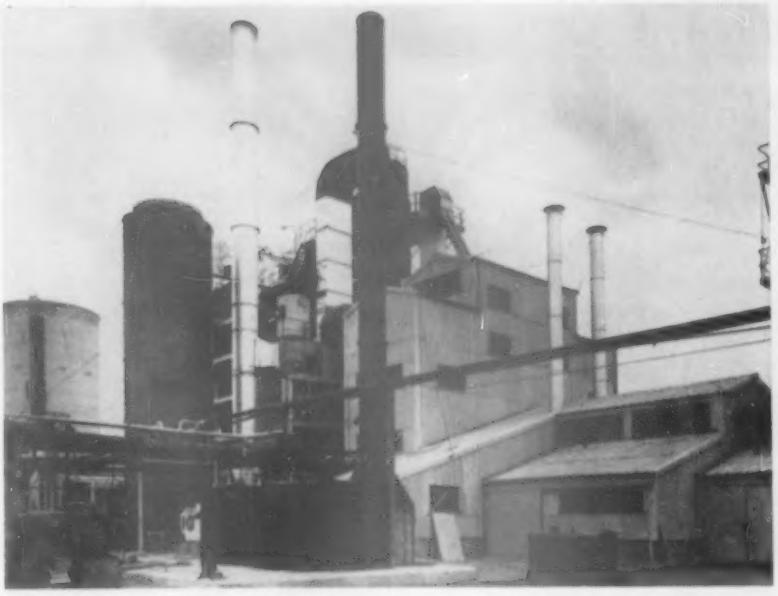
reactor is controlled by the oil-air ratio, flow turbulency, and extent of combustion permitted—all of which have a marked influence, apart from the reactor design, on the quality and quantity of black produced. Oil is thus decomposed to yield mainly carbon black and hydrogen. A fraction of the oil as well as a portion of the hydrogen are burned along with the fuel. The combustion gases provide a protective blanket between the reactor wall and the zone of decomposition of oil, thereby preventing accumulation of carbon deposits within the reactor.

Black separation . . . The remainder of each plant is concerned with the separation of the black produced from the accompanying gas, and its conversion into a convenient product for transport. The initial step is reduction of gas from approximately 1,100° to 550° F. in three stages: water spray at the end of the reactor (primary quench); passage along the common atmospheric-cooling pipe in which products from the reactors are collected; and passage up a vertical, cylindrical cooling tower fitted with open water sprays (secondary quench).

Agglomeration . . . The black-in-gas suspension enters the electrostatic field of 75,000 volts in a double precipitator of the Cottrell type. Constructed of wrought-iron, they are lagged to prevent undue condensation and fitted with discharge valves and explosion doors. The electrical equivalent of a 75,000-volt d.c. field is produced from the local a.c. supply through transformers and rotary rectifiers. Here the very fine particles are agglomerated into small clusters; nearly 30 per cent of the furnace black is thereby collected at the base of the electric precipitator. Any bypassing of gas in this plant is prevented by the incorporation of a feather plate.

Cyclones . . . The next stage is primary and secondary cyclonic treatment where, by the mild centrifugal action induced, a further 65 per cent of the black is recovered. There are six cyclones on the O plant and two on the A installation. Both for reasons of economy and for complying with more stringent regulations against atmospheric pollution, particular attention has been paid to the problem of removing the residual 5 per cent black, which in some cases is blown to air by American plants normally situated in areas remote from major urban centers.

Bag filter . . . To this end, the gas is passed through a bag-filter unit consisting of box frames in parallel covered with bags of closely woven fiber glass. At hourly intervals the gas stream is diverted from each frame in turn and the black collected at the base of the unit by automatically tapping the frame. The filtered gas is then released to the atmosphere.



THIS CABOT CARBON PLANT at Stanlow, Cheshire, England, uses a charge stock from catalytic cracking.

Pelletizing . . . The black from the bases of precipitators, cyclones, and bag filters is carried by stainless-steel conveyor and a special-type elevator to the micropulverizer. Here it is treated to assure that it meets specifications for fineness. So recovered, the black is light and fluffy, with a bulk density of 2 to 3 lb. per cu. ft., or an apparent specific gravity of about 0.05. In this condition it can neither be packaged readily nor transported economically. It is therefore passed through a pellet mill wherein the black, by patented rolling means, is converted into relatively dustless pellets of 250-1,000 μ in diameter with a bulk density of approximately 23 lb. per cu. ft., and an apparent specific gravity of about 0.35.

The units employed at Avonmouth are dry pelletizers and resemble cement kilns in that they rotate, transforming the fluffy black into more easily handled pellets. Pelletizing reduces the dust nuisance in subsequent handling. In pellet form, the black is much more convenient for compounding into rubber. Finally, the process leads to cheaper packaging cost, and calls for much less warehousing space.

Packaging . . . The pelletized black passes from the mills to overhead storage hoppers from which it is filled into multiwalled paper sacks by machines with exhaust devices which prevent the black from escaping into the atmosphere. Three large warehouses are available to hold 60 days' production.

Cabot Carbon Plant

The first carbon-black unit of Cabot Carbon, Ltd., British subsidiary of Godfrey L. Cabot, Inc., of Boston, Mass., was commissioned in July 1950 (as reported in The Oil and Gas Journal at the time) with a capacity of 20 million pounds a year. Construction of a second similar installation, commenced in September 1951, was completed in April 1953, thus doubling the original capacity.

The two grades of blacks produced by Cabot in U.K. are Vulcan 3 with a mean grain diameter of 265 A. and a surface area (by nitrogen adsorption) of 77m² per gm; and Sterling SO with a mean diameter of 412 A. and a surface area of 41m² per gm.

Feed from cat cracker . . . The black is manufactured by incomplete combustion of the liquid-hydrocarbon residue from catalytic cracking. This is fired as a fine spray mixed with air and the input rates and relative quantities of hydrocarbon and air determine the grain size. The process is a continuous one. The plant is out of action only for routine maintenance, and otherwise runs for virtually 365 days a year.

Port Tennant

The Port Tennant plant is operated by the Amalgamated Anthracite Collieries, Ltd., which concluded an agreement with the United Carbon Co. of Charleston, W. Va., U. S. A., to turn its existing installation over to making the latter's blacks in Britain.

New emulsion-breaking agent removes water and oil blocks

by Grover Kilgore

A NEW emulsion-breaking agent has been developed which has proved highly effective for increasing oil flow in fractured and normal formations. The new chemical agent was developed to provide an improved treatment for removing water and emulsion blocks in oil-producing formation and for breaking through the viscous emulsions that may be formed with refined fracturing oils.

Field testing and commercial applications are very encouraging. Wells near Palestine, Tex., that were producing ½ to 2 bbl. per day are now making 8 to 12 bbl. per day sustained production. Two other areas now using the agent extensively because of excellent results obtained when used ahead of a refined fracturing oil that often causes a particularly bad emulsion.

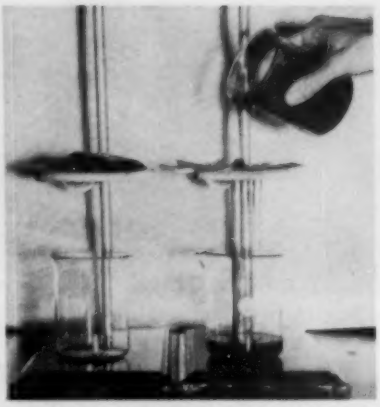
Used straight to improve production or as a technique for obtaining better fracturing results, the treatments require only a relatively small volume of the new agent and can be completed with a minimum of lost time. Either type of treatment requires only 1 to 2 hours of shut-in time.

For straight treatments, the agent is mixed in the proportion of from 1 to 2 gal. of the chemical to 2 bbl. of diesel, kerosine, or crude oil, 25° B. or higher, for each foot of formation. If the produced oil is below 25° B., a better mixture and results can be obtained by using a light diesel oil.

Variations of this ratio can be used where the situation demands and the entire mixture should be pumped into the formation with the volume of oil displacement varying to fit particular conditions. Previous treatments have varied between no displacement to a volume of oil equivalent to that used to mix the agent.

As a fracturing aid, the total amount of chemical depends upon the size of the fracturing job. From 15 to 60 gal. are usually mixed with the desired amount of oil and injected ahead of the fracturing fluid. Then, the wells have consistently cleaned up better. Comparative treatments in the same pool show greater increase in production.

Author is vice president, Halliburton Oil Well Cementing Co., Duncan, Okla.



THICK EMULSION at left is formed by fracturing oil and water (viscosity too thick to measure). At right, the emulsion was prevented by the new emulsion breaker.

Trade name for the compound is Hyflo.

Water blocks . . . The presence of high-connate water or water introduced into the well can form water and oil emulsions as a result of normal production or when flow towards the well bore is increased by induced fractures. The water is frequently foreign to the formation and may come from a variety of sources such as loss from drilling mud or water from a casing leak.

Interstitial waters, usually present in most formations, can cause a partial or complete water block to the flow of oil to the bore and will always reduce the effective permeability of the sand to the flow of oil. Theory holds that continued oil production will cause a gradual movement of the connate water to reduce further this effective permeability.

Fracturing oil emulsions . . . The problem of reduced permeability has become more widespread with the increasing use of fracturing techniques that employ crude oils, refinery products, or emulsified crude oils of varied viscosities as carrying fluids. Some of these fluids or crude oils from the formations can combine with various waters to form emulsions that are usually more viscous than the crudes and form an even more effective block to the flow of oil than water alone.

In addition to their high viscosity, emulsions often exhibit thixotropic properties and become so thick that they resemble an elastic solid. When such an emulsion is stirred or caused to flow, the thixotropic structure is partially destroyed but will slowly heal on standing.

When both water block and water-oil emulsions are present, often in fairly close proximity to the well bore, more resistance to flow is created than can be overcome by formation pressure. Since such emulsions can increase fluid viscosity from 10 to 2,000 times that of the oil in place, any effective breaking or preventing of these emulsions will be of great benefit in increasing production flow toward the well bore.

Field tests . . . In developing an improved agent for preventing or destroying these barriers, many compounds were thoroughly examined in both laboratory investigations and field testing. Many of the tested compounds were injected into the formations by dispersing them in crude oils, diesel oil, or kerosine as a carrier. One particular compound displayed an extremely high degree of effectiveness in breaking and preventing emulsions and, by lowering surface tensions, in breaking through water blocks.

Final laboratory tests earlier this year and extensive field use under varying conditions indicated that this agent was a greatly improved production aid that incorporated many new advantages. New wells drilled in with oil and otherwise free of bentonitic materials and old wells of the same nature which were making water usually responded to simple treatment.

Lowers interfacial tension . . . All tests and field applications indicate the new agent is a more effective emulsion-breaking agent than has been previously used; is able to lower the surface tension of water; and is extremely efficient in lowering the interfacial tension between oil and water.

In the well the solution of the agent contacts free waters in the formation and water imprisoned in an emulsion. Surface tension of this water is reduced over 50 per cent, which lowers the Jamin effect and gives far less resistance to flow where gas and fluid are intermingled in capillary channels. Laboratory data in the following chart has been substantiated in continuing field use:

	Surface tension (dynes per cm.)	
Concentration Hyflo:	Salt water	Fresh water
0.025 per cent	31	32.7
0.0125 per cent	31.8	33.6

This compound's ability to reduce the interfacial tension between oil and water is indicated by tests with a 0.1 per cent concentration in oil that showed measurements as low as 0.6 dynes per cm. when in contact with several oil-well brines. This low interfacial tension imparted to oil-water systems permits a much more efficient removal of water from oil-bearing formations.

The new agent is more oil soluble, permitting easier dispersing and removal and a more even distribution of the active chemical in all parts of the formation during the treatment. When mixed with diesel fuel or light crude oils in the ratio of 1 gal. to 2 bbl. of oil, part of the Hyflo will be in solution while the remainder will be in suspension. After thorough mixing with the oil, the agent will remain suspended for a minimum of 3 hours. It is a neutral, noncorrosive compound that is very easy to handle. Its freezing point is below minus 20° F. to facilitate winter storage and handling.

Sucker rods make a handy drum rack

THE simple drum rack shown in this picture was made by the welder of the Sinclair Oil Co. in Fullerton field of Andrews County, Texas. Used to hold emulsion-treating chemicals at the tank batteries, the support can easily be tipped over by one man into a horizontal position for pouring. When in the horizontal position, a tongue swings out to form a third leg and to keep the front of the drum upright. As the liquid is drained from the drum, the leg can be moved inward so as to tilt the front further down.

The frame is made to fit the drum, with the rockers made so that they loop around and form the base of the drum rack as shown.

ELEVEN portable furnaces are heating tool joints at this drilling location near Mt. Carmel, Ill.

Portable furnace aids tool-joint fitting

DELAY and inconvenience to the drilling contractor when applying shrink-fit tool joints to his drill pipe can be avoided by carrying portable furnaces to the drilling site. The furnaces weigh only 37 lb. each and will heat a tool joint in less than 5 minutes. Thus, the work can be scheduled for times when the pipe is not being used in drilling, and it is not necessary to ship the pipe to a central shop to change tool joints.

In a recent job at a well near Beech Grove, Ky., 100 new 5-in. tool joints were applied to 3½-in. drill pipe in an 8-hour period. The time included removing the pipe from the mud boats and erecting sufficient pipe racks, as well as the actual replacement of the tool joints.

The trailer shown in the accompanying pictures is used by Elmer J. Daman, tool-joint serviceman for National Supply Co. at Olney, Ill., in the Illinois, Indiana, and Kentucky oil fields. The trailer carries 11 portable ring-type furnaces and four 100-lb. propane-gas tanks, as well as electric buffers, a 500-ft. extension cord, spanner wrenches, and other tools.

APPLYING a heated tool joint to a length of drill pipe from which a worn-out tool joint has been removed.

An oxy-acetylene torch is used to remove the worn-out tool joints; the pipe ends are cleaned; and new tool joints, heated to the proper temperature, are applied.

Derrick men practice on safety slides

Shell Oil Co. has recently been running practice sessions in its Ventura area to familiarize derrick men on company rigs with the use of the derrick man's safety slide. The practice run is over 100 ft. long and is built on the side of a steep slope so that those practicing are never more than a few feet off the ground.

The slides are never used except in extreme emergencies, and other safety measures have greatly reduced the likelihood of need for the slides. Operation of the slide in normal drilling has become very infrequent, although they remain vital to the derrick man's safety. The slide is relatively simple but the practice runs familiarize the man with it so that in a real emergency precious seconds can be saved.

Unsteady State Flow in Gas Reservoirs—7

Estimating Pressure Distribution Graphically

by Dr. R. F. Nielsen

THE general differential equation for plane-radial isothermal flow of a gas in a porous medium is:

$$\frac{d^2p^2}{dr^2} + \frac{1}{r}\frac{dp^2}{dr} = \frac{\mu f}{Kp}\frac{dp^2}{dt} \quad (1)$$

if Darcy's law is obeyed. Supercompressibility factor Z is assumed constant but not necessarily unity. The difficulty of solving this equation analytically is that it is not linear in p^2.

If pressure changes are not large compared to average pressure, modification of Equation 1 leads to solutions which may be sufficiently accurate. If volume is assumed a linear function of pressure over the range in question, solution of transient problems is the same as for liquids. That is, p is substituted for p^2 in Equation 1; and p in the denominator is considered constant at the average value. Thus 1/p corresponds to compressibility coefficient c for liquid flow. Superposition methods may then show effect of sudden change at the well.

If pressure changes are not large, one might take Equation 1 as it stands and regard $\mu f/Kp$ as constant. This assump-

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tion was made by Cornell and Katz,[1] and the method will be illustrated here.

A well of 3-in. effective radius completely penetrates a 30-ft. uniform gas sand, permeability 0.15 perms, and porosity 18 per cent. Shut-in reservoir pressure is equalized at 2,400 psia. Gas viscosity is 0.02 cp., Z is 0.8, and temperature in formation 120° F. The well is opened to a constant rate of 1 M.M.s.c.f.d. Find average distribution at some time if transient boundary does not reach reservoir boundaries in this time.

In Fig. 1, the abscissa is marked in equal values of r/r_w, arbitrarily taken as 180. Vertical lines are drawn at 180, 360, 540, etc., or r = 45, 90, 135, etc. ($\Delta r = 45$). The "slope" of the pressure curve near the well, due to production, is found from the radial-flow formula:

$$\frac{dp^2}{d \log r} = \frac{10^6 \times 2.3 \times 14.7 \times 0.8 \times 580 \times 0.02}{\pi \times 520 \times 30 \times 0.15} \quad (2)$$

$$= 42{,}600$$

Line AB is drawn with this slope intersecting the second vertical line at initial pressure. Lines CD, EF, GH, IJ, KE, KG, LM, LI are drawn in that order. KE and LM are parallel to AB. Pressure distribution is given by the dot-dash line passing through L and I, but above line LI. Extension to the well, $r/r_w = 1$, is not shown. It is linear on the semilog plot and gives $p^2 = 5{,}643{,}100$ at the sand face; or p = 2,375.

The time to which calculated distribution corresponds is determined by material balance. Total production is:

$$\frac{2\pi \times 30 \times 0.18 \times 520}{14.7 \times 0.8 \times 580} \times \int (2{,}400 - p)\, r\, dr \quad (3)$$

Graphical integration gives about 60,000 s.c.f., so that distribution is at 0.06 per day. An approximation of the time to which distribution corresponds is given by:

$$t = 3\,(\Delta r)^2\, \mu f/Kp \quad (4)$$

In the present case, $t = 3 \times 45^2 \times 0.02 \times 0.18/0.15 \times 2{,}400 = 0.06$ per day, in agreement with that obtained by material balance.

If there is a certain pressure distribution due to production, and the rate is suddenly changed to a new constant rate, then lines are again drawn to initial pressure distribution (dotted line in Fig. 2). Slope of the first line drawn, AB, is given by the new rate. For shut in, the slope would be zero. The order of drawing is AB, CD, EF, GH, IE, IG, KJ, JL. The dot-dash line of Fig. 2 shows distribution after an assigned time when the new rate is lower than the old.

Cornell and Katz give a formula for correcting pressure near the well for turbulence:

$$p^2 - p^2\,(\text{cor}) = \frac{4.24\ ZTMF\ Q^2}{b\ f^{1/4}\ K^{1/4}\ h^2\ r} \quad (5)$$

Q is in millions of standard cubic feet per day, K in md., and h and r in feet. M is molecular weight, F formation resistivity factor, and b a flow constant for the formation. Substituting 1.41/f for F and $0.03\ (FK)^{1/4}$ for b (from a graph by Cornell and Katz) and expressing K in perms:

$$p^2 - p^2\,(\text{cor}) = \frac{ZTM\,Q^2}{f\,K\,h^2\,r} \quad (6)$$

Taking M as 17, correction at well bore is about 0.27 psi, since $\Delta(p^2) = \Delta p/2p$, nearly.

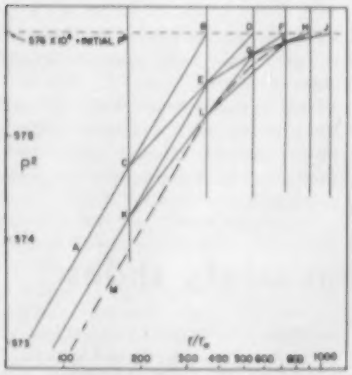

FIG. 1—Graphical method for obtaining pressure distribution in transient, with initial pressure uniform. (After Cornell and Katz.)

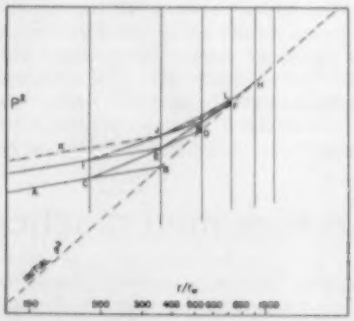

FIG. 2—Graphical method for obtaining pressure distribution in transient, with initial pressure not uniform. (After Cornell and Katz.)

Reference

1. Cornell and Katz, Petr. Trans. A.I.M.E., 1953, p. 61.

ELECTRIC LOGGING—48

The Basis for Interpreting Gamma-Ray Logs

by R. I. Martin

THE rate of disintegration is a characteristic of each substance. It is not affected by heat or pressure.

It has been found by careful tests that all rocks contain measurable quantities of radioactive material, although it is generally present in very minute amounts. Igneous rocks contain the greatest quantities. Light-colored acidic types, like granite, contain the most, while the heavy basic types contain less. Sedimentary rocks are derived from the breakdown of igneous rocks and will contain some of this radioactive material. It is divided very unequally among sedimentary rocks. The most common radioactive element is the isotope of potassium K 40 which is most plentiful in shales. An exception, of course, is potash beds, but shales are more frequent in occurrence. It is possible to set up a table showing the radioactivity in decreasing strength:

Organic marine shale (black shale)
Shale
Calcareous shale
Sandy shale
Shaly limestone, shaly sand
Sand, sandstone, limestone, and dolomite
Salt and anhydrite

These variations in radioactivity form the basis of the interpretation of gamma-ray logs. The log is recorded with radioactivity increasing to the right. In this way, a curve is obtained which displays peaks somewhat similar to the S.P. curve. That is, the shale breaks are on the right-hand side of the log while the lower radioactivity corresponding to sands, for example, appears as peaks to the left.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy, Rolla.

This is done because the gamma-ray curve will only distinguish lithology, as is the case with the S.P. curve. It cannot distinguish between oil-bearing and water-bearing formations, so that a correlation with a resistivity curve would not be so apparent.

Unlike the S.P. curve, however, the gamma-ray curve is not related directly to lithology. It measures the radioactivity, which is related to lithology, but not in a rigorous manner. For example, some sands and some limestones may contain radioactive material, and hence will not log with strong features in such cases.

For obtaining a log, one company uses a form of Geiger counter. This consists of a metal tube which may be either partially evacuated or filled with a certain gas under pressure. In its simplest form the tube has a central conductor insulated from the outer shell. A potential of the order of 1,000 volts is applied between the electrode and the outer shell.

If the counter is placed in a well, some of the gamma rays emitted by the formation will hit the instrument. In doing so they may collide with a free electron. The energized electron may then travel through the interior and in so doing will ionize the gas within. It is possible, however, for a gamma ray to pass all the way through the counter without hitting an electron.

Ionization of the gas will allow current to flow between the two electrodes. This current flow is of extremely short duration but may be recorded. By means of certain refinements the counter has been made more sensitive.

As the Geiger counter reacts to gamma rays hitting it, then the larger the counter the more gamma rays it will intercept, and hence the sensitivity will be increased. Certain limitations are imposed, however. The diameter must be limited if the instrument is to be used in most wells. The length of the counter is limited because a long counter will have too great an averaging effect, resulting in a loss of detail on the log.

It will be shown, however, that a counter 4 ft. long will give good results in practice.

Another difficulty is that the gamma-ray emission is not at a steady rate. The number of gamma rays passing a given point during a certain time interval is statistical in nature. The total number of gamma rays entering any part of the bore hole is quite limited. Even the number intercepted by a counter 4 ft. long and 3 in. in diameter may be tens or hundreds per second. The counter reacts to these rays individually. If they were recorded directly, a very irregular curve would be obtained.

In order to reduce the effects of statistical variations the impulses received at the surface are impressed on a condenser. The charge on the condenser increases as more impulses arrive. The potential across the condenser will increase, and may be measured by the recording galvanometer. A resistance in the circuit allows the condenser to discharge. As a result, the potential across the condenser will assume a value which is dependent on the average rate at which the impulses arrive.

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Designing and Applying High-Speed Turbines—1

by H. Steen-Johnsen

A LARGE portion of the steam turbines bought by industry are for direct drive of the driven machine, such as pumps, compressors, paper mills, refrigeration machines, etc. Turbines used for these drives are referred to as mechanical-drive turbines, and the horsepower spread is from 5-hp. pump drives to 15,000-hp. blast-furnace compressor drives and higher for special applications. These turbines may be single-stage or multistage turbines and with either single or multiple inlet valves. In this field there is a trend to multistage machines in the small horsepowers which takes advantage of the increased efficiency of the multistage turbine.

Looking at the turbine speeds, we find that the speeds cover a wide range—from 1,200 r.p.m. up to 10 to 12 thousand r.p.m. The majority of applications have been in the 2,500 to 4,000-r.p.m. speed range, but recently there is a growing demand for 3,000 to 5,000-hp. turbines in the high-speed bracket from 7,000 to 12,000 r.p.m.

This demand for turbines originates with an increasing demand for compressor drives by refineries and other process industries such as steel-mill coke ovens, gas works, refrigeration, and so on. Throughout there is an over-all increase in compressor applications to include higher pressure ratios and smaller volumes requiring higher r.p.m. speeds. Also, with the advent of the gas turbine, compressor design has received a lot of attention. New centrifugal and axial-flow designs have been developed and tip speeds have started up. Current designs go to 900 ft. per second and higher. Indications are that they will move on up. Diesel-engine superchargers that are universally used on "over-the-road locomotives" have been built since 1942 with tip speeds around 1,250 ft. per second.

Author is chief engineer, turbine division, Elliott Co., Jeanette, Pa. Paper presented at the petroleum mechanical engineering conference of the A.S.M.E. held in September 1954 at Los Angeles, Calif.

When we refer to turbine drivers as high-speed turbines, it should be kept in mind that it is not enough to talk about r.p.m. and let it go at that. We built 12,000-r.p.m. turbines 20 years ago for 700 hp., and these machines are by no means comparable to the turbines we think of as high-speed machines today.

The r.p.m. value has to be translated to the more specific term "blade speed," and it has to be evaluated together with steam flow to determine how much power is wrapped up in a small package.

The "standard turbine" . . . The present discussion is to be concerned principally with high-speed turbines. To get the design comparison between high-speed and what we may call "standard" turbines, let's first take a look at a standard machine rated around 1,500 hp. and 5,000 r.p.m.

The simplest multistage turbine (Fig. 1) has evolved from the single-stage MD turbine. It retains the single-inlet valve with lower-half admission, hand valves, and the same orifice oil-governor arrangement using an oil pump at the end of the shaft for the speed impulse. The disks are shrunk on the shaft and the blades are what may be termed standard—that is, the first-stage wheel may use the same blades as the single-stage turbines and the following stages use the blades from industrial 3,600-r.p.m. generator drives. The casing has an intermediate section that may be varied in length to suit the number of stages required. This makes a simple and rugged mechanical arrangement within the speed limit mentioned, without introducing excessive cost.

The single-inlet valve on this turbine has certain limitations when used with an oil governor. These are overcome by using a vertical relay governor, Fig. 2. These limitations relate principally to throttle pressure, temperature, and flow. With the vertical-relay governor, an oil servo can be used to handle the valve and more precise positioning of the valve is possible. Thus, closer regulation results, larger steam flows and horsepower can be handled, and external process control can be applied.

For further increase in flow and steam pressure requiring additional refinement of the control system, a bar-lift steam chest with multiple-inlet valves is used.

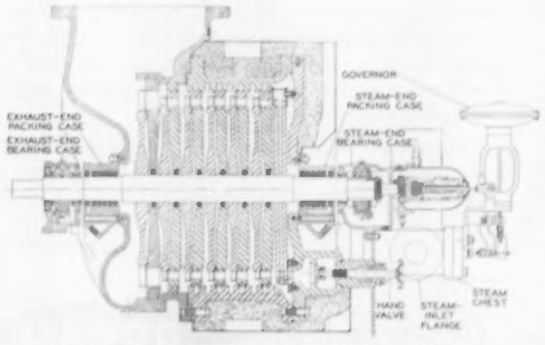

Fig. 1—Simple multistage turbine with single-inlet valve.

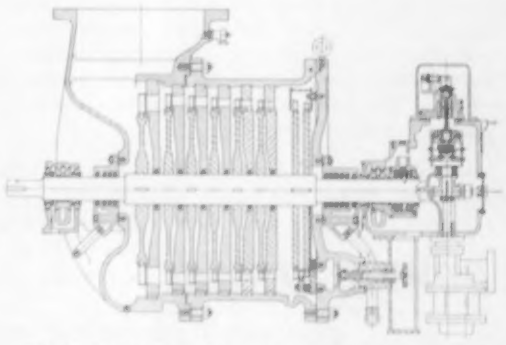

Fig. 2—Multistage turbine with vertical relay governor.

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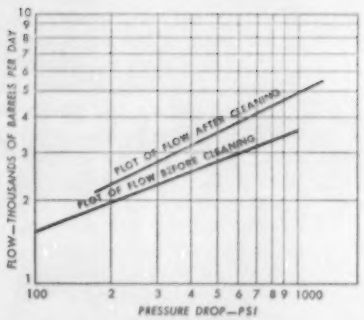

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How to Design In-Tank Jet Mixing Systems—13

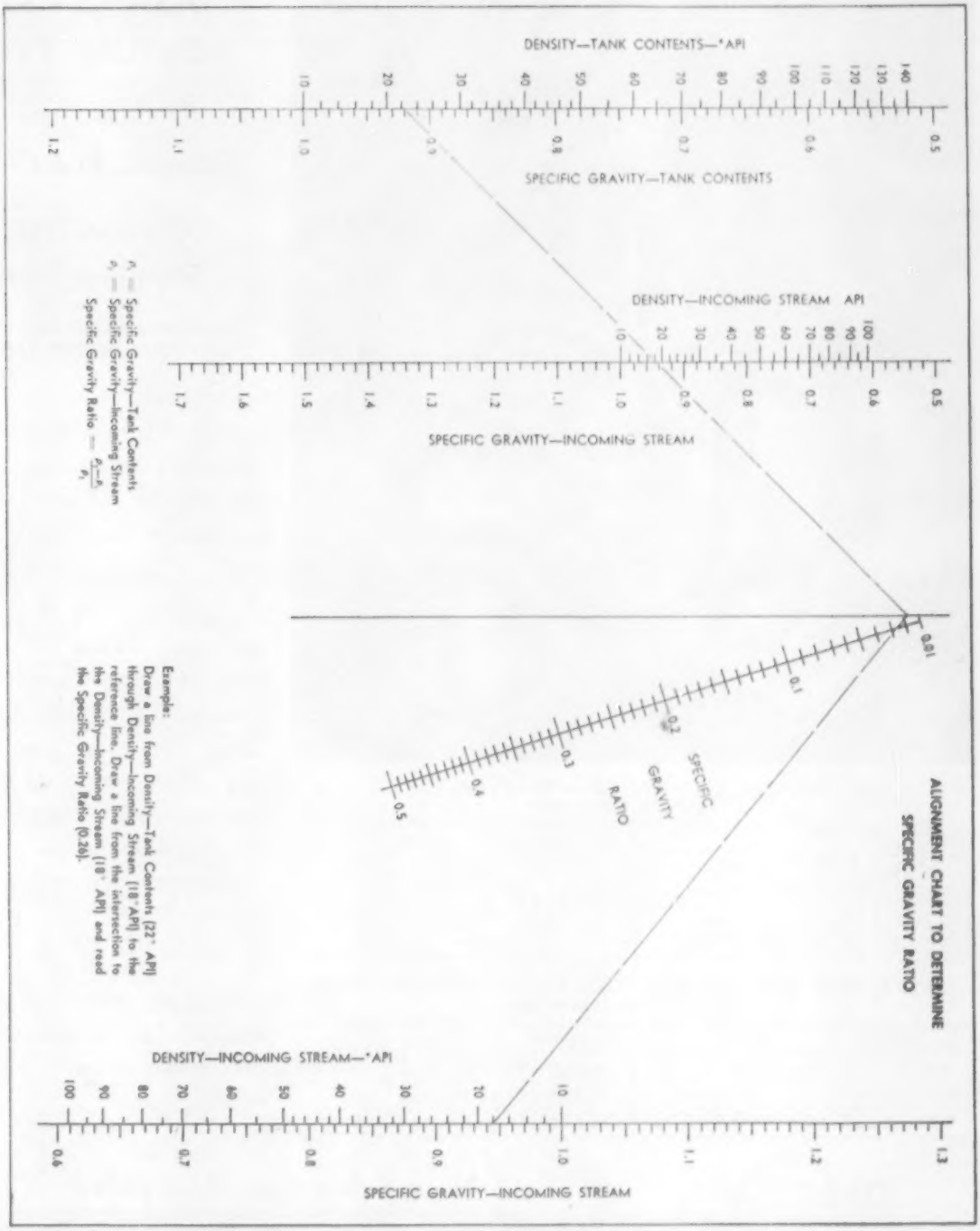
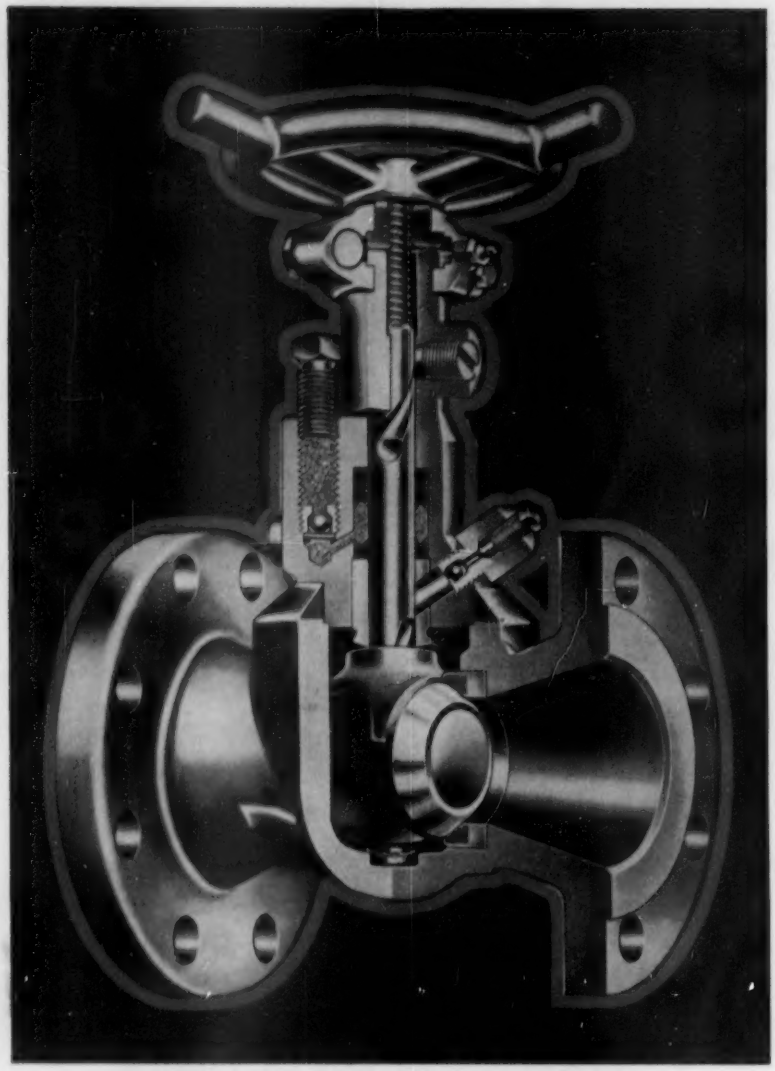

DENSITY—TANK CONTENTS—°API
SPECIFIC GRAVITY—TANK CONTENTS
DENSITY—INCOMING STREAM API
SPECIFIC GRAVITY—INCOMING STREAM
P_t = Specific Gravity—Tank Contents
P_i = Specific Gravity—Incoming Stream
Specific Gravity Ratio = $\frac{P_t - P_i}{P_i}$
SPECIFIC GRAVITY RATIO
ALIGNMENT CHART TO DETERMINE SPECIFIC GRAVITY RATIO
Example:
Draw a line from Density—Tank Contents (22° API) through Density—Incoming Stream (18° API) to the reference line. Draw a line from the intersection to the Density—Incoming Stream (18° API) and read the Specific Gravity Ratio (0.26).
DENSITY—INCOMING STREAM—°API
SPECIFIC GRAVITY—INCOMING STREAM

Fig. 10.

This material from E. I. du Pont de Nemours & Co., Inc.



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400 Lb.	4", 6"	2500 Lb.	2½", 3", 4"
600 Lb.	2", 2½", 3", 4", 6"		

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600 Lb.	1", 1½", 2", 2½", 3", 4"	2500 Lb.	1", 2", 2½", 3"

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by W. L. Nelson
Technical Editor

COST-imating

How to Use Itemized Cost Indexes

MOST of the items shown on this page are the average of several or many items of equipment. Thus, 1946 base prices or costs corresponding to the items shown here are possible for only the following few items:

	1946
Labor:	
Skilled, per hour	$1.80
Common, per hour	1.033
Refinery construction, per hour	1.416
Refinery operation, per week	56.75
Brick—building, per M.	19.43
Brick—fireclay, per M.	57.31
Pipe—sewer, per foot	0.297
Flow meter (mech.), each	190.00
Flow meter (air), each	295.00
Flow meter (remote), each	495.00
Potentiometer, each	600.00
Potentiometer (air), each	475.00
Press control, each	225.00
Pressure gage, each	19.80
Thermometer, each	346.50
Control valve, each	144.00

All of the items were described briefly on page 105 of the July 7, 1952, issue.

The indexes may be used to convert prices known at any date, to prices at other dates by ratios of cost indexes of the same dates. Especially complete prices (1946) are available in The Oil and Gas Journal reprint of the Cost-imating Series (October 21, 1948-December 29, 1949). It is necessary, of course, to assume that the average indexes shown here can be applied to specific equipment of the same general kind as that used in determining the index.

Similar Itemized Cost Indexes are published quarterly in the first weekly issues of April, July, and October.

Itemized Cost Indexes

(Multiply the 1946 prices of the Cost-imating Series by these Index Numbers divided by 100.)

	1948	1950	1951	1952	1953	1954 Aug.	References*	Index for earlier years (The Oil and Gas Journal unless noted) in Cost-imating issues
Labor:								
Skilled construction	125.0	140.0	148.3	157.9	167.3	174.9	Eng. News Record	No. 55—Nov. 3, 1949
Common labor	131.0	148.1	156.8	168.2	181.2	194.5	Eng. News Record	No. 55—Nov. 3, 1949
Refinery construction	128.0	144.0	152.5	163.1	174.2	184.7		No. 61—Dec. 15, 1949
Refinery operation	126.0	137.6	149.1	155.1	165.2	173.0	‖Sur. of Current Business	No. 55—Nov. 3, 1949
Equipment or materials:*								
Arc welding machinery				151.3	154.7	157.5	Code ‡11-76	
Boilers, tanks and sheet metal	†140.0	†136.0	†156.1	†153.4	†150.3	146.9	Code 10-72	April 21, 1952§
Boiler tubes, 2-2¼ in.	†135.0	149.5	163.3	168.8	188.3	203.1	Code 10-14-61	
Building materials (nonmetallic)	147.1	154.8	164.3	164.4	171.1	174.4	Code‡ 13	No. 22—Mar. 17, 1949
Brick—building	122.8	132.5	141.2	140.6	142.8	145.1	Code 13-41	No. 20—Mar. 3, 1949
Brick—fireclay	133.3	153.4	165.3	167.1	181.8	190.2	Code 13-42	
Castings (foundry products)	144.6	152.9	167.2	168.0	176.8	181.0	Code 10-15	No. 46—Sept. 1, 1949
Clay products (structural, etc.)	121.3	134.6	145.2	145.8	153.1	157.9	Code 13-4	No. 20—Mar. 3, 1949
Concrete—ingredients	119.4	125.3	132.7	132.7	137.8	143.5	Code 13-2	No. 22—Mar. 17, 1949
Concrete—products	118.9	124.4	132.8	132.6	135.9	139.2	Code 13-3	
Electrical machinery	127.6	134.9	154.3	152.4	156.4	159.4	Code‡ 11-7	See Marshall-S. (below)
Electrical motors and generators	128.6	135.0	155.8	154.6	157.1	157.8	Code‡ 11-73	No. 31—May 19, 1949
Electrical switchgear				161.4	165.0	161.9	Code ‡11.75	
Electrical transformers, etc.	127.0	131.6	147.7	148.0	156.9	171.2	Code‡ 11-74	No. 31—May 19, 1949
Engines (composite)	116.9	126.0	146.1	146.5	148.1	150.6	Code‡ 11-54	No. 36—June 23, 1949
Exchangers	130.0	140.0	152.0	165.8	174.9	166.4	Manufacturer	No. 2—Oct. 28, 1948
Fans and blowers	131.3	162.9	190.1	183.7	185.5	192.6	Code 11-47	Feb. 17, 1949§
Hand tools	125.2	143.2	154.2	155.1	165.4	173.1	Code 10-42	
Instruments (composite)	120.0	127.8	142.3	146.2	151.9	153.9	Manufacturer	No. 34—June 9, 1949
Flow meter (mechanical)		114.0	126.8	132.3	147.8	160.5	Manufacturer	No. 34—June 9, 1949
Flow meter (air control)		138.5	157.6	160.5	170.4	178.8	Manufacturer	No. 34—June 9, 1949
Flow meter (remote)		135.5	151.7	155.2	151.5	146.0	Manufacturer	No. 34—June 9, 1949
Potentiometer, 6-point		134.0	146.6	151.5	157.8	162.0	Manufacturer	No. 34—June 9, 1949
Potentiometer, air control		134.1	136.8	144.9	152.6	148.6	Manufacturer	No. 34—June 9, 1949
Pressure controller recorder		135.6	153.3	158.4	163.7	166.3	Manufacturer	No. 34—June 9, 1949
Pressure gage		101.2	108.6	108.6	108.6	108.6	Manufacturer	No. 34—June 9, 1949
Thermometer (recording)		124.0	144.3	149.4	152.6	152.3	Manufacturer	No. 34—June 9, 1949
Control Valve		133.3	155.5	155.5	162.5	162.0	Manufacturer	No. 34—June 9, 1949
Insulation materials	126.8	125.0	128.8	130.4	133.5	136.1	Code 13-72	
Lumber (composite)	181.0	193.0	208.5	203.2	201.1	200.1	Code 8-1	No. 7—Dec. 2, 1948
Lumber (Southern Pine)	174.3	176.9	189.1	191.2	189.6	182.5	Code 8-12	No. 7—Dec. 2, 1948
Lumber (other soft woods)	206.5	230.2	252.7	248.5	256.8	252.3	Code 8-13	
Machinery—general purposes	124.9	136.7	153.0	151.8	155.1	158.3	Code 11-4	Feb. 7, 1949§
Machinery—construction	127.8	140.1	155.3	157.5	162.3	165.2	Code 11-2	
Machinery—oil field	†125.9	†135.8	†149.6	†149.9	†156.3	161.6	Code 11-51	
Paints—prepared	141.4	140.0	153.8	155.7	156.7	159.0	Code 6-21	
Pipe, sewer	†119.1	†129.9	†147.1	†146.6	†150.6	151.6	Code 13-45	No. 22—Mar. 17, 1949
Pumps, air compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.6	Code‡ 11-41	No. 29—May 5, 1949
Steel (iron and steel)	141.1	152.9	166.7	168.5	177.4	180.8	Code 10-1	No. 61—Dec. 15, 1949
Steel—finished steel	160.4	182.6	196.9	201.2	216.6	228.6	Code 10-14	
Steel—plate and sheet		(See boilers, tanks, etc., above)						
Steel—structural shapes	145.0	162.7	172.6	179.1	188.8	199.7	Code ‡10-14-31	No. 18—Feb. 17, 1949
Valves and fittings	†125.9	†135.8		¶190.8	193.1	195.7	Code‡ 11-49 (1-6 & 11-14)	No. 46—Sept. 1, 1949
Nelson Refinery Construction	132.5	146.2	157.2	163.6	173.5	180.9		No. 61—Dec. 15, 1949

*Code refers to the revised index code number of the Bureau of Labor Statistics, U. S. Department of Labor, "Wholesale Prices." †Estimated base value for 1946. ‡Not exactly the same items as those published before July 7, 1952. §Questions on Technology, The Oil and Gas Journal. ¶Revised. ‖Preliminary.

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Controlling Slime and Algae Growths—1

How Slime and Algae Foul Cooling-Water Systems

by R. B. Conlan

SLIME and algae growths present a problem of considerable importance in industrial cooling-water systems. Particularly in the petroleum industry, where large amounts of cooling water are used, a proper slime-control program is of utmost importance.

The microscopic organisms found in fresh water may be divided into classes according to their shape, structure, size, and other characteristics. These are known as algae, protozoa, fungi, etc., and each of these classes may be further subdivided into numerous specific organisms. In industrial supplies these organisms are responsible for a number of difficulties. Where water is used in once-through and recirculating cooling systems, biological fouling in the form of slime and algae growths creates problems as serious as those encountered with scale formation and corrosion.

Algae characteristics . . . The algae are among the lowest and simplest forms of plant life, and the term "algae," as commonly employed, covers a large variety of genera and species. They are usually blue or blue-green in color, although some forms contain brown, purple, or red coloring matter. The various species may occur as single or multicellular organisms. While six general classes of fresh-water algae are commonly recognized, for practical purposes these are usually grouped as diatoms, blue-green algae, and green algae.

Algae growths in industrial cooling-water systems, such as spray ponds and cooling towers, may impede proper heat transfer and cooling. Voluminous growths of algae may clog pipelines and pumps. Algae growths also secrete certain aromatic oils which give off offensive odors. The odor of a particular organism is intensified when the organism dies or when an increase in water temperature occurs.

Author is with W. H. and L. D. Betz Co., Philadelphia.

Slime is a gelatinous mass resulting from the growth of micro-organisms. It will often contain mechanically entrapped organic and inorganic debris and may also contain a wide variety of organisms such as algae, fungi, and bacteria. In industrial cooling-water systems, the major sources of slime formation are usually the slime-forming bacteria. Bacteriological slime results from the action of bacteria on food materials and the formation of a gelatinous substance surrounding the organisms. The sheath of gelatinous material not only serves to entrap other materials which add to the general bulk, but also acts to protect the bacteria against the action of slime-control agents.

Where slime accumulates . . . Slime growths may accumulate to such an extent as to completely clog the screens on the auction of circulating pumps, necessitating shutdown for cleaning. These growths may foul spray nozzles in ponds and cooling towers, causing poor distribution of the water and generally interfering with proper functioning of the system. On heat-exchange equipment such as turbine condensers and compressors, slime growths retard cooling to such an extent as to cause a serious loss in plant efficiency.

The heat-insulating effect of only a few hundredths of an inch of slime deposit on heat-exchanger surfaces is sufficient to decrease plant efficiency markedly. Slime accumulations in industrial cooling systems have aggravated adherence of corrosion products. Pitting may result beneath slime growths even though otherwise effective anticorrosion treatments are in use.

The corrosion load imparted by the presence of corrosion products and foreign matter in a cooling-water system has been demonstrated by installing a small filter in a hot return line from a plant system, followed by a test rack.[1] The data given in Table 1 indicates that the losses for the cold unfiltered water are substantially higher than losses for the hot filtered water. Normally, specimens in hot water show a much higher loss than cold-water specimens. Under the conditions of the test, specimens in the hot were subjected only to the corrosion load imparted by the water characteristics. On the other hand, specimens on the cold line were subjected to the corrosion load imparted by the water characteristics and the suspended matter.

TABLE 1—EFFECT OF SUSPENDED SOLIDS ON CORROSION LOAD

Pump Discharge (Unfiltered)

Days	Loss, mg.	Penetration*
14	51	0.0035
28	221	0.0075
42	205	0.0046
56	509	0.0086

Return Line (Filtered)

Days	Loss, mg.	Penetration*
14	78	0.0053
28	137	0.0046
42	58	0.0013
56	76	0.0013

*—inches per year.

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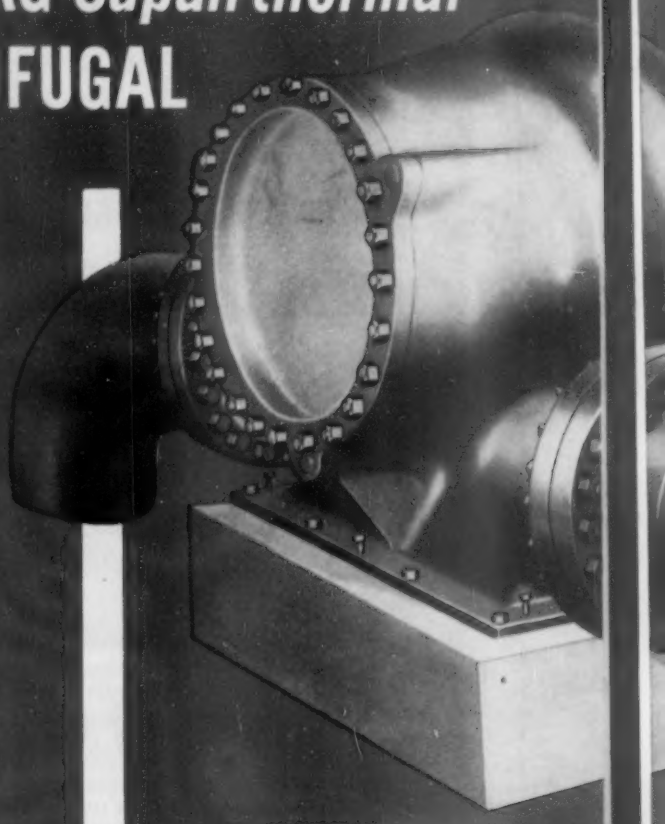
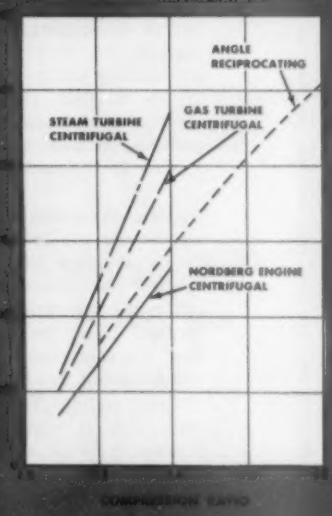
for Maximum Economy in GAS PIPE LINE SERVICE



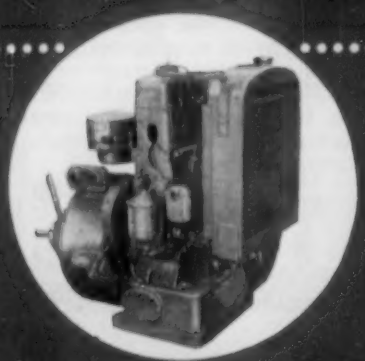
• Nordberg Mfg. Co., pioneer builder of internal combustion engines, presents the latest development in compact, dependable power for maximum efficiency and economy in gas pipe line transmission service.... *The Nordberg Supairthermal Engine-Driven Centrifugal Compressor Unit.*

Through use of exclusive design principles, the Nordberg *Supairthermal* spark-ignition gas engine operates at better than 40% thermal efficiency—with correspondingly lower fuel cost, increased horsepower, lower lube oil consumption, and lower maintenance costs per horsepower hour. The *Supairthermal* engine drives the compressor through a close-coupled speed increasing gear mounted on the bedplate extension of the engine. *Here, then, is an extremely compact, efficient engine-driven compressor unit which can be installed at low capital investment and operated at lower cost per horsepower than any other type of gas pipe line prime mover.*

With a complete range of engine types and sizes to choose from, backed by engineering experience second to none, it will pay you to consult Nordberg on specific power problems. *Call or write for full details, outlining your requirements.*



Savings of thousands of dollars per day in fuel costs on large gas pipe lines can be realized with the Nordberg engine-driven centrifugal gas compressor unit because, as the graph at the right shows, the Nordberg unit requires less fuel to compress gas than any other modern type of equipment of comparable capacity.

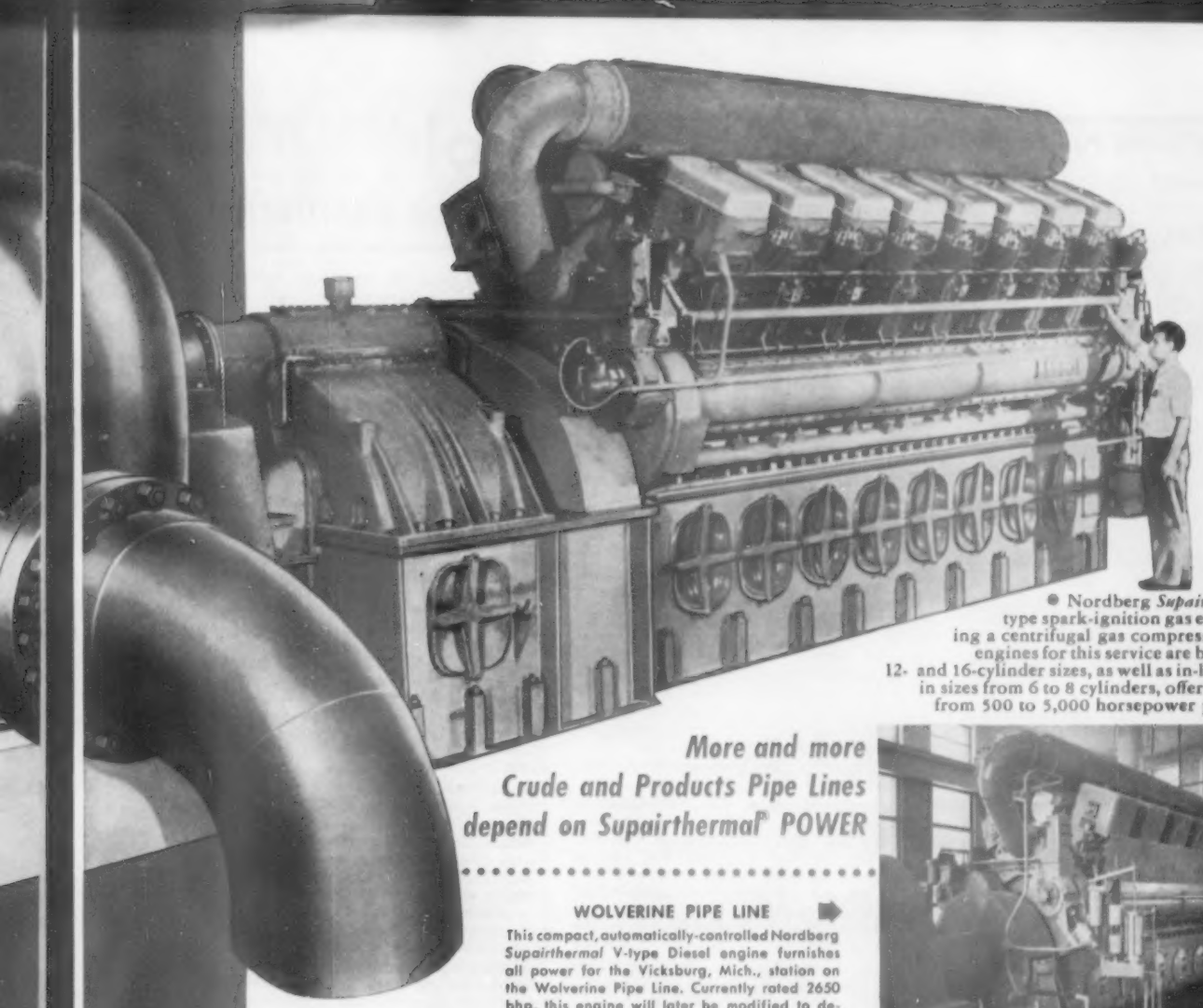


NORDBERG POWER CHIEF GAS ENGINES

• NORDBERG *POWER CHIEF* Gas Engines are low cost, medium speed units, built for rugged oil field service. In jobs like production pumping and rig lighting, where 'round-the-clock performance is a must, you'll find these sturdy *POWER CHIEF* units capable of delivering maximum power at minimum operating and maintenance cost.

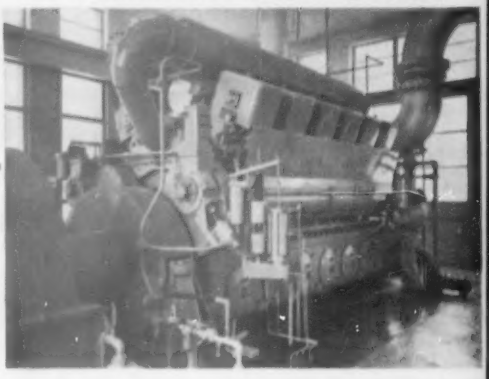
Sold as power units, delivering 18 hp max., with clutch power take-off . . . and as "packaged" generator sets producing up to 10 kw.

POWER CHIEF units are also available for Diesel service in 1, 2 and 3 cylinder units, from 10 to 45 hp.



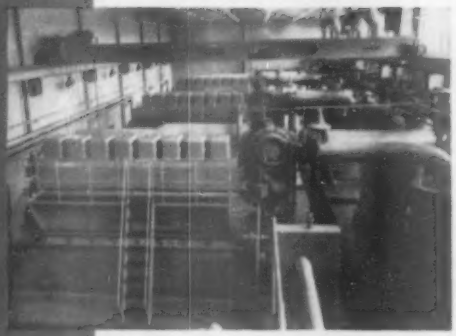
● Nordberg *Supairthermal* V-type spark-ignition gas engine driving a centrifugal gas compressor. V-type engines for this service are built in both 12- and 16-cylinder sizes, as well as in-line engines in sizes from 6 to 8 cylinders, offering a range from 500 to 5,000 horsepower per engine.

More and more Crude and Products Pipe Lines depend on Supairthermal® POWER



WOLVERINE PIPE LINE ➡

This compact, automatically-controlled Nordberg *Supairthermal* V-type Diesel engine furnishes all power for the Vicksburg, Mich., station on the Wolverine Pipe Line. Currently rated 2650 bhp, this engine will later be modified to develop 3200 bhp when additional line capacity is desired.

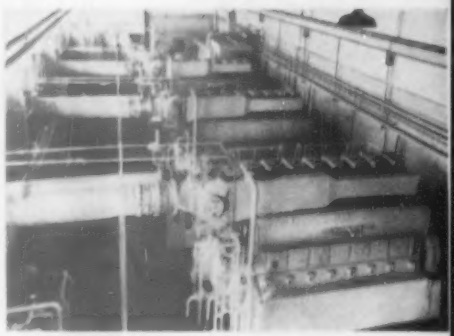


⬅ LAKEHEAD PIPE LINE

Twelve power-packed Nordberg *Supairthermal* engines will provide a total of 22,680 bhp for pumping stations along the Lakehead Pipe Line from the Canadian border to Superior, Wis., and from there to Sarnia, Ont.

TRANS MOUNTAIN PIPE LINE ➡

Twelve powerful, compact Nordberg *Supairthermal* engines totaling over 20,000 horsepower have been given the tough power assignment of supplying the "big push" over the Canadian Rockies of crude oil from Edmonton, Alta., to Vancouver, B.C., for the Trans Mountain Pipe Line Co., Ltd.



NORDBERG MFG. CO., Milwaukee, Wisconsin

Builders of America's Largest Line of Heavy Duty Engines—10 to over 10,000 Horsepower

NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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Shut Down Pumping Equipment *Automatically*

WHEN: Tank is pumped out. Line breaks or leaks. Lines "paraffin up" or remote valves are closed.

REGULAR—45 Series

For distributor, magneto or dual magneto engines.

MURPHY Safety Switches provide accurate gauge and safety protection in ONE low-cost instrument.

E-45 Series

Same accurate gauge and safety protection for electric motor powered equipment

Sold by Engine Dealers and Supply Stores
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For Your Protection . . .

TAPECOAT®

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The service behind TAPECOAT is as distinctive as this coal tar coating in tape form. The sales engineer who sells the job also services it personally. That's why you can specify TAPECOAT with confidence and know that you are getting lasting protection for pipe, pipe joints, tanks and other vulnerable steel surfaces above or below ground. Sizes: Rolls of 2", 3", 4", 6", 18" and 24" widths. Easy to apply. Dependable since 1941 in cutting maintenance and replacement costs. Write for details and prices.

The TAPECOAT Company

Originators of Coal Tar Tape Protection

1539 Lyons Street, Evanston, Illinois

Pipeline Patrol

. . . Report on Construction

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Ar-Mex Pipe Line Co.—Company has applications for two lines before the Office of Defense Mobilization Board for rapid amortization approval.

1. A crude-oil line from Albuquerque, N. M., to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery being planned by Frost & Associates of Dallas.

2. A crude-oil line from Guernsey, Wyo., to Albuquerque.

Magnolia Petroleum Co.—This company will operate a 48-mile, 12-in. submarine pipeline for itself and Continental Oil Co., and Newmont Oil Co. The line will run to blocks off the coast of St. Mary's Parish, Louisiana, and will have a capacity of 50,000 bbl. per day. Brown & Root, Houston, has the contract and expects to be finished by the middle of 1955.

Minnesota Pipe Line Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000, is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming, to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. cost: $3,500,000.

Standard Pipe Line Co.—Company plans to build two crude lines. Applications are now before the Office of Defense Mobilization for rapid amortization approval.

1. A 350-mile, 16-in. crude line from Glendive, Mont., to Guernsey, Wyo., to connect with Platte Pipe Line Co.'s system there.

2. A 330-mile, 16-in. crude line from Wink, Tex., to Albuquerque, N. M. This line would serve a 10,000-bbl. refinery being planned by Frost & Associates of Dallas.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. 12-in. line. Bids being asked.

• **West Coast Pipeline Co.**—The off-again-on-again plans for this crude line from near Wink in West Texas to near Norwalk in California are presently before the Office of Defense Mobilization. A three-man board of nonindustry members recently recommended that the project be dropped. They questioned the ability of West Texas to produce enough crude to supply both the East and West Coasts in time of war. The three-man board favored building a line from California's Elk Hills Naval Reserve to be held in standby for possible future need.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. 2d section of 32 miles from Lockport to Des Plaines, Ill., let to Contract and Material Co. of Evanston, Ill.

65 miles of 12-in. from Des Plaines to Rockford let to Contracting & Material Co. Evanston, Ill.

56 miles of 12-in. from Rockford to Madison let to Mid States Construction Co. of Mount Vernon, Ill. Whole line to be completed in January.

• **California-Oregon Pipe Line System.**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Great Lakes Pipe Line Co.—Company has started construction of a 162-mile, 10-in. line from El Dorado, Kans., to Kansas City. Capacity will be 36,000 bbl. per day.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

• **Keystone Pipe Line Co.**—Company has ODM writeoff of 25 per cent for $1,875,000, 48-mile, 8-in. products line from Boot, Pa., to the Fullerton, Pa., terminal.

Malco Pipeline, Inc.—Company planning to build a 91-mile, 6-in. products line from its Prewitt, N. M., refinery to Albuquerque.

Moore Stoner Co.—Company has $2,500,000 tax amortization for a 200-mile, 6-in. products line from a connection with Oil Basin Pipe Line Co.'s terminal at Glendive, Mont., to Minot, N. D.

"Why don't you pay attention to what you're doin', Bifocals?"

Pipeline Patrol

• **Products Pipe Line Co.**—This subsidiary of Goliad Corp. has received a fast writeoff for 40 per cent on $126,000 and 25 per cent on $1,781,000 for L.P.G. line from the Wilcox natural-gasoline plant in Lavaca County, Texas to Texas City.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

Standard Oil Co. of Texas.—Company laying a 248-mile, 6-in. products line from El Paso to Albuquerque. The line will move 5,000-bbl. daily when finished and will cost $4,000,000. Houston Contracting Co. has job.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has asked FPC permisison to abandon "Little Inch" gas line. If permission is granted, company will spend $71,000,000 converting the line to a products line with a capacity of 235,000-bbl. per day.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles of 8-in. under way from Haines northward through Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Construction Co. are doing the work.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Loupisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000. FPC approved.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, later lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

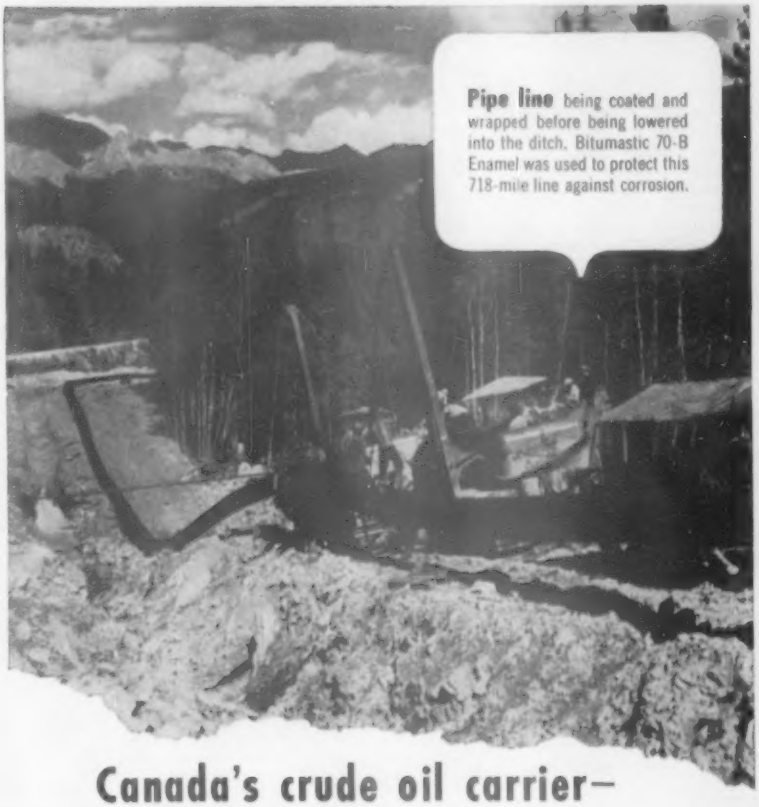
• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Hope Natural Gas Co.**—Proposing to ouild a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County line, West Virginia. Estimated cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build three natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City.



Pipe line being coated and wrapped before being lowered into the ditch. Bitumastic 70-B Enamel was used to protect this 718-mile line against corrosion.

Canada's crude oil carrier—

Trans Mountain Oil Pipe Line

—protected by Bitumastic 70-B Enamel

A river of oil now rolls all the way from Edmonton, Alberta, to Vancouver, British Columbia—a distance of 718 miles. Each day, more than 100,000 barrels of crude oil can be pumped through the Trans Mountain Oil Pipe Line that was recently completed.

Building this new 24-inch pipe line wasn't easy. Mountains had to be climbed. Rivers had to be forded—forded, at times, by using sealed sections of pipe as pontoons for temporary bridges. In some mountainous terrain, after using trucks, tractors and winches, pipe had to be carried into position, piece by piece.

A pipe line laid in such rough terrain deserves exceptional protection against corrosion. Recognizing this, Trans Mountain has coated the exterior surfaces of its new line, all 718 miles of it—with Bitumastic® 70-B Enamel. More than 20 years of satisfactory service protecting oil and gas pipe lines prove that Bitumastic 70-B Enamel is an excellent corrosion barrier.

For your next pipe-line project, specify Bitumastic Enamel. Get in touch with us for complete details and estimates.

KOPPERS BITUMASTIC® ENAMELS

KOPPERS COMPANY, INC.
Tar Products Division, Dept. 103-T, Pittsburgh 19, Pennsylvania

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

Pipeline Patrol

Third line would run from Louisiana to Florida., 20, 24, 30-in., pipe considered in plans. Engineering firm reported preparing an economic report on the lines at present.

Kansas Pipe Line Corp., Inc.—Company proposes to build 16-20-in. line to Wichita. Starting point for line has not yet been established. The line, which would have a capacity of 100 million cu. ft. daily may start in the Barber-Harper County area 100 miles southwest of Wichita, or it may be necessary for the company to go farther west to the Hugoton field. The line will cost approximately $5,000,000 and will be entirely intrastate.

• **Kansas-Nebraska Natural Gas Co., Inc.** Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

S. E. HUEY & CO.

ENGINEERS & SURVEYORS

HENINGER BLDG.

MONROE, LA.

SURVEYING & MAPPING

PIPE LINE SURVEYS

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., Doddridge, Wetzel and Marshall counties, West Virginia. Fulghum Contracting Co. doing work.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in loops. Majority will be in Wisconsin.

• **Missouri Public Service Co.**—136 miles. 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

Natural Gas Pipe Line Co. of America.—Company has proposed a 280-mile line from Wise County, Texas to Panhandle field in Texas where it would connect with the NGPLCA to Chicago.

• **Natural Gas Producers, Inc.**—This subsidiary of Colorado Interstate Gas Co. has applied to the Colorado Public Utilities Commission for permission to build a 48-mile, 10-in. pipeline to link Denver with northeastern Colorado gas fields. The company will also build 3 miles of 8-in. and 10 miles of 4-in. The entire project will cost $1,374,000.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virgina, to Narrows and Dublin, W. Va.

• **North Dakota Natural Gas Co.**—This company has moved back into the gas picture in North Dakota with a bid to build a 274-mile, $11,017,200 system from Tioga to Fargo to Grand Forks. An original application filed several months ago was complicated by a later application filed by Northern Natural Gas Co., to serve the same area.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Company has just recently finished a large summer expansion. Still planned are:

170 miles of 20-24-in. line in Minnesota and Wisconsin running from Duluth to Superior.

400 miles of 24-in. line from the Canadian border to tie in with its system at St. Paul-Minneapolis.

500 miles of 24 or 30-in. planned across North Dakota from Tioga past Minot to Fargo and from there eastward to the Twin Cities.

• **Northwest Alabama Gas District.**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by FPC.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in.,

VERSATILE

CROSE-LITTLEFORD

MODEL 211-10 P2

PIPELINE COATING KETTLE

For transporting on highway.

For tough pipeline terrain.

10 Barrel capacity, complete with hydraulically operated agitator and low pressure burner, self-starting air cooled gasoline power unit. Mounted on tandem rocker beam assembly. Equipped with pneumatic tires and detachable (tire) tracks.

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Pipeline Patrol

proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southwest Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

• **Tennessee Gas Transmission Co.**—Company has FPC authority to build 243-mile, 24-in. line from Hebron storage field in Potter County, Pennsylvania to existing facilities near Greenwich, Conn. Company will also build an 18-mile connecting line between Hebron storage field and Harrison storage field.

• **Texas Eastern Transmission Corp.**—Proposed, 382-mile, 24-in. line from Kosciusko, Miss. to Beaumont, to connect with the existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• **Transcontinental Gas Pipe Line Corp.**—Company has received FPC permission to loop 173 miles of its line between Texas and New York with 30 and 36-in. pipe, and to lay 58 miles of 12 and 16-in. lines. Project will cost $29,700,000.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—Company has signed agreement with Pacific Northwest Pipeline Corp. and has revived plans for its line from the Peace River area of Alberta to the United States border near Vancouver, B. C. Tentative plans call for work to begin sometime in 1955.

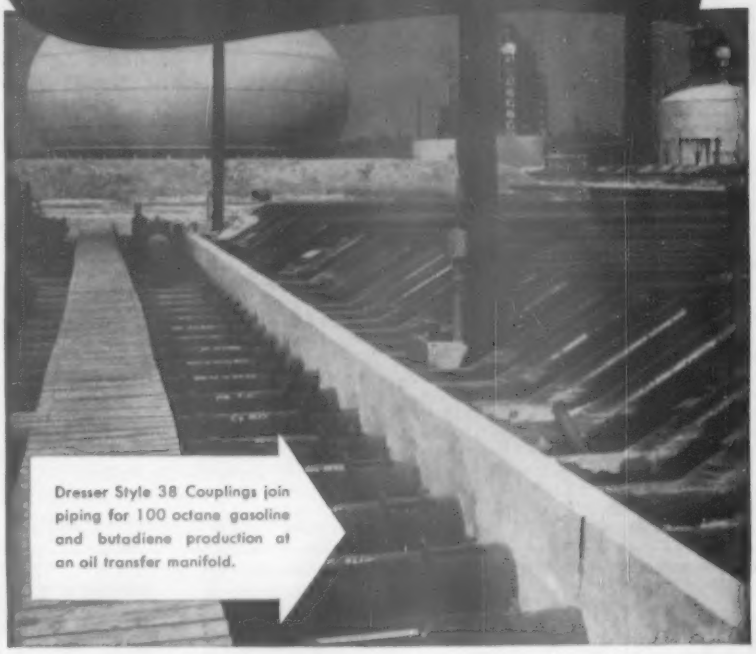
Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in. contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp.

"The shower stall cost us practically nothing."

around a refinery...
the DRESSER way
is easier...surer!

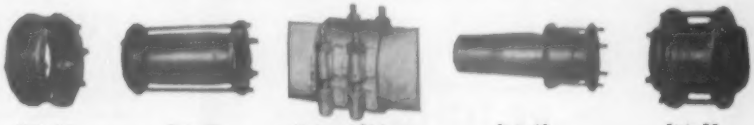


Dresser Style 38 Couplings join piping for 100 octane gasoline and butadiene production at an oil transfer manifold.

You'll find many piping applications in and around oil terminals and refineries where Dresser Couplings will simplify and speed up joining work. They're particularly advantageous for tank and equipment installations.

Dresser Couplings provide attractive features for refinery applications . . . they're easy and fast to install, bottle-tight and safe. The specially compounded rubber gasket permits up to 4° deflection at joints—yet with Dresser Couplings, these joints stay permanently tight.

AVAILABLE AT LEADING OILFIELD SUPPLY STORES



Style 38 Coupling | Style 40 Long Sleeve | Hydrepair*Asbestos Cement Pipe Clamp | Style 63 Expansion Joint | Style 39 Insulating Coupling

*HYDREPAIR is a trade-mark of Dresser Manufacturing Division

DRESSER® COUPLINGS

Dresser Manufacturing Division, 49 Fisher Ave., Bradford, Pa. (One of the Dresser Industries).
Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Airport Blvd., S. San Francisco, Calif.

Pipeline Patrol

contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season during summer. Work resumed September 15.

Compania Shell De Venezuela.—Company will build a pipeline from its Block I field off the western shore of Lake Maracaibo to its terminal at Palmarejo. The line will be known as "Lapline" and will run 18 miles in the lake and 27 miles on land. The underwater section will be 16-in., and the remainder will be 24-in.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

Peace River Oil Pipe Line Co., Ltd.—Company plans to build a 16-in. line connecting Sturgeon, South Sturgeon, and Little Smoky fields in Alberta to a planned 106-mile, 12-in. line which would move the crude south to Trans Mountain Pipe Line Co.'s Edson, Alta., station.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzcapotzalco, Mexico.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Yacimientos Petroliferos Fiscales Bolivianos.—Bolivian Government oil organization has awarded contract to Williams Brothers, Sudamericana, Ltd., to construct a 6-in. crude line from Camiri field to Yacuiba on the Argentine border. The project will cost approximately $2,500,000.

Foreign Products Pipelines

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

• **National Fuel Oil Co.**—This company in Israel is a shareholder in a company which plans to build a products line between Haifa and Tel Aviv. The plans call for a 6-in. line in which the Government would own 10 per cent.

North Atlantic Treaty Organization (NATO).—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line). Contracted by Soc. Foster Wheeler Francaise.

Overland Pipeline Corp.—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000, from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Winnipeg & Central Gas Co.—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D. plant and move it to Winnipeg. Size and route of the line has not been definitely established.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering contracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd. for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in.,

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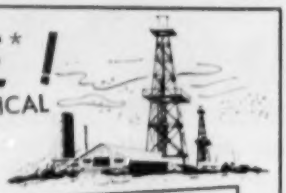

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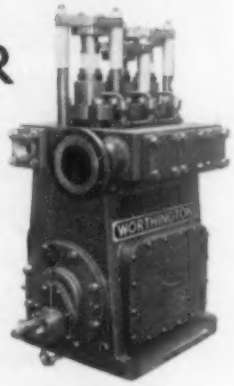

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under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in. planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co., Ltd.—Morrison Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd.**—Company planning 2,200 miles of 24-36-in. natural-gas line from the Alberta-Saskatchewan boundary to Toronto and Montreal. Also plans a 24-in. later from Winnipeg to Emerson, Man. Twenty-inch lateral from Niagara to Toronto now in operation.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

Crude-Burning Diesels Found to Be Economical

Cheaper fuel costs but no greater service expense. This is the experience of Bell General Pipelines Co. with crude burning diesel engines at two Texas stations.

The engine at Bell's Overton station, near Gladewater, burns 12 bbl. of crude daily to pump 17,000 bbl. of crude 38 miles from the station to the Bullard tank farm. The engine was given its first overhaul at 9,014 hours and the second after an additional 18,200 hours—making the engine a veteran of over 27,000 hours all on crude operation.

Crude used by the engine is East Texas sour crude right off the line. It is drawn from the bottom of the tank into a 600 bbl. settling tank, then pumped into two 12-bbl. tanks on stands. From there the crude gravity feeds to filters to clear excess water and is heated with jacket water. Then it goes into the normal fuel filtering system on the engine.

With crude at $2.80 per barrel, this means operation cost of $30 per day—cheap in comparison with refined fuel. Almost any crude can be used in Cat engines, says Caterpillar Tractor Co. In all cases, stainless steel or other noncorrosive parts are needed in the fuel system to overcome destructive properties of salt sulfur water and certain acids characteristically present in crude oil.

It may be necessary also to centerfuge the crude to rid it of paraffin, some of the water, sand, and other mineral sediment, although Bell does not do this.

It has proved so successful that Bell later installed another model at the No. 2 station near Tyler with the same Gould Pumps, Lufkin Speed Increasers, the same filtering and jacket heating arrangements. Since then McMurray Pipelines Co. has decided to repower, using a diesel engine and a similar arrangement.

BOOK

MINERAL RESOURCES OF FORT DEFIANCE AND TOHATCHI QUADRANGLES, ARIZONA AND NEW MEXICO. By John Eliot Allen and Robert Balk. Bulletin 36, 216 p., 19 tables, 21 figures, and colored geologic map and sections. State Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Campus Station, Socorro, New Mexico. $2.50.

This is an unusually comprehensive study of a part of the southwest corner of the San Juan basin in New Mexico and Arizona. The report includes geologic description of 484 sq. miles of the Navajo Reservation, in which are the Defiance anticline, Buell Park Caldera, and the south end of the Chuska Mountains. Descriptions of 30 rock units ranging in age from pre-Cambrian to Recent shown on the colored geologic map, which is printed on a photomosaic base, are included, as well as a special section on sedimentary petrology by Max Willard. Although commercial deposits of uranium and oil have yet not been discovered in the area, the formations in which they occur elsewhere are carefully described and delineated with numerous detailed measured sections.

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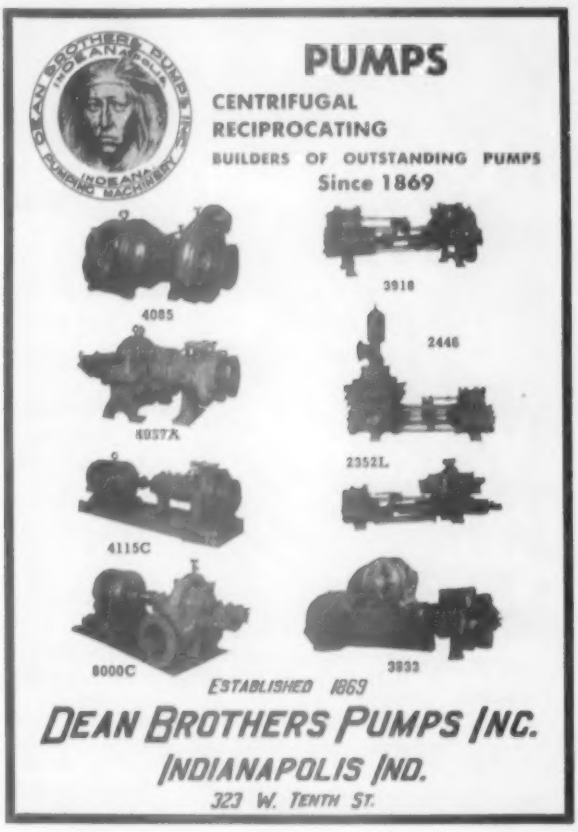

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Among the

Drilling Contractors

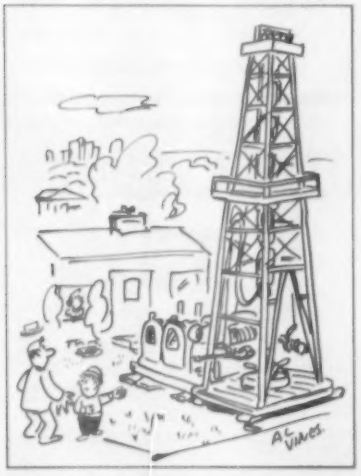
O. K. Smith Drilling Co. is scheduled for a 2,500-ft. wildcat test to be drilled for W. L. Cotton at 1 Martinez, in Blas Maria grant, 11 miles northwest of Escobas, in Zapata County, Southwest Texas. Location is about 4½ miles north of West Jennings field.

Cooper-Herring Drilling Co., is contractor on a 4,800-ft. Woodbine wildcat test Evans Production Corp., of Dallas, is putting down at 1 Jones, in the Timothy Devore Survey, 5½ miles north of Mabank, in Kaufman County, East Texas.

Delta Gulf Drilling Co., Tyler, Tex., is under contract for another well Texas Gulf Producing Co. and Pan American Production Co., joint operators, will drill in the new development under way on the northwest flank of Napoleonville dome, in Assumption Parish, Louisiana Gulf Coast. Location is for 3-A Dugas & LeBlanc, in 28-12s-14e.

Grace Drilling Co., Houston, is scheduled for an 8,500-ft. test to be drilled for H. L. Hawkins, of New Orleans, at 1 Plaisance, in 24-17s-20e, west of production at Valentine, in Lafourche Parish, Coastal Louisiana.

Clyde Hall Drilling Co., Bakersfield, Calif., is drilling for Pacific Western Oil Corp. in the Telephone Hills area, near McKittrick, in Kern County, California. The test, 81A Rankin, is 500 ft. north of the area's discovery, and, so far, only producer, completed four years ago by Pacific Western. The latter well now on the pump flowed initially at the rate of 3,500 bbl. of oil daily from Oceanic sand at 5,395-5,495 ft.



"Remember that 'Win Yourself a Drilling Rig Contest?' . . . Well, I won it."

Bankhead Drilling Co., New Orleans, has a new contract operation under way for Fifteen Oil Co., of Houston, in the Charenton area, St. Mary Parish, Louisiana Gulf Coast. It is at 6 Veeder Hunt, in 30-13s-10e, in the eastern sector of the field. A 9,650-ft. test is planned.

F & H Drilling Co., Tyler, is contractor on a newly started 6,200-ft. well in Slocum field, 3½ miles southwest of Slocum, in Anderson County, East Texas. It is a contract job for King & Sawtelle and associates. Location is for 1 Davey, about 3,050 ft. west of the discovery well.

Enterprise Oil Co., Bakersfield, Calif., has taken a contract for drilling a 5,300-ft. test for J. Wallace Bostick and associates at an outpost location a half mile southeast of production in the Raisin City area, in Fresno County, northern California. Designation of the test is 1 Fresno Land Co. Location is in 29-15-18.

Halbert Drilling Co. has a new wildcat operation under way 5 miles south of Kemp, in Henderson County, East Texas. It is a contract job for F. R. Jackson at 1 H. B. Todd estate, in the John Baker Survey. Plans call for carrying the hole to 4,500 ft.

Bush Drilling Co. is contractor on F. E. Jameson's initial test in the Clear Creek area, Allen Parish, southern Louisiana. Location is for 1-A Perkins, in 5-6s-7w. Hole is projected to 9,000 ft.

Exploration Drilling & Oil Co. has a rig under contract to Earle M. Craig, Jr., for a projected 8,750-ft. wildcat test 11 miles northeast of Ozona, in Crockett County, West Texas. The test is Craig's 1 Smith, in Section 16, Black AB.

Crow Drilling Co., Ltd., Shreveport, is scheduled for another Cotton Valley test for Austral Oil Exploration Co., Inc., of Houston, in the Bayou Middle Fork area, of Claiborne, Parish, north-

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western Louisiana. Location, at 1 Gray, in 8-22n-5w, is 2,100 ft. northeast of the Lyons, McCord & Logan's Cotton Valley discovery well. It will be Austral's second Cotton Valley test. The new pay is around 8,000 ft.

Elliott & Wiggins, Wichita Falls, will drill a deep wildcat test 8½ miles southeast of Floydada, in southern Floyd County, Texas Panhandle. It is a contract job for Russell Maguire, of Wichita Falls, at 1 Bunch, in Section 32, P. D. Adams Survey. Location is ¾ mile southeast of the one-well Floydada Cisco lime field. Hole is projected to granite, expected around 8,100 ft.

Lynn Drilling Co. is under contract to Carter Oil Co. for a 7,000-ft. Mississippian test located 1 mile southeast of United Producing Co.'s Chester (Mississippian) gas discovery well, 1 Evans, and about 2 miles east of the latter's Morrow (Pennsylvanian) gas discovery well, 2 Evans, in Beaver County, Oklahoma Panhandle. Location is for 1 State-Richards, in 16-5n-25eCM.

Jet Drilling Co., Denver, is moving in rig for a test Shell Oil Co. will drill 1,500 ft. south of its Railroad Valley discovery well, 65 miles southwest of Ely, Nev. The new test is the first in the immediate vicinity of the discovery well, Nevada's first and, so far, only production, since the completion of that well early in 1954.

H. L. Rowley, Inc., Shreveport, has contracted for a 9,000-ft. well to be drilled for Southern Natural Gas Co., of New Orleans, in the Locust Ridge area, of Tensas Parish, eastern Louisiana. The new operation, 1 Watson, in 28-10n-11e, is a direct offset to the area's discovery well, which the contractor drilled for his own account. The discovery well is productive of gas and condensate from Wilcox sand at 9,076-96 ft.

Rowan Drilling Co., Houston, has contracted for another deep test Ted Weiner, of Fort Worth, has projected for the Orange Grove area, of Terrebonne Parish, Louisiana Gulf Coast. It will be Weiner's 6 Wylie, located in 84-17s-16e, and set up for an 11,000-ft. test.

Stephens & Phillips will drill a 4,500-ft. Woodbine test under contract for John B. Stephens, R. E. Moore, and W. M. Coats, of Mount Pleasant, Tex., at 1 Winkle, in the Allen Dillard Survey, 4 miles south of Newsome, Camp County, East Texas.

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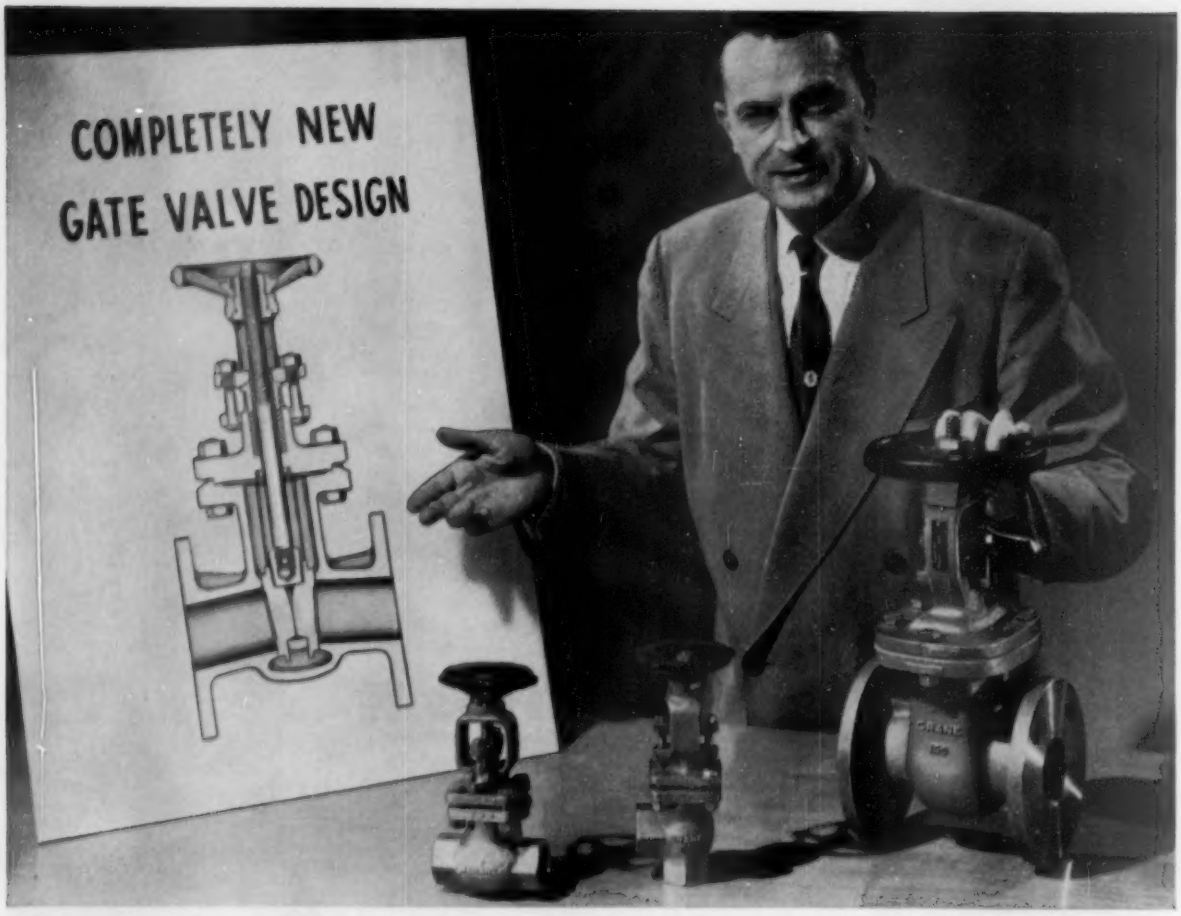

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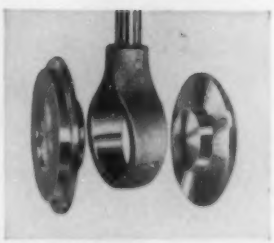

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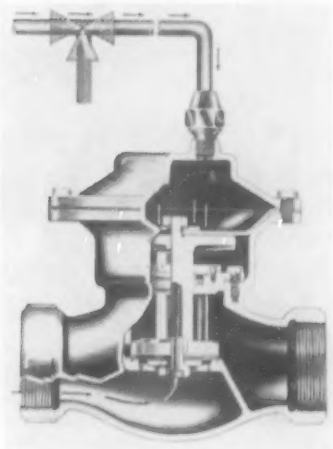

Hydra-Matic Valve Works At Three-To-One Ratio

A new nonferrous, pressure-operated Hydra-Matic valve is for handling air, gases, water, or oil.

The brass valve, or diaphragm construction, is designed to operate on a three-to-one ratio. It can be remotely controlled by means of line pressure through bypass tube, pressure from separate source through a three-way pilot valve, or by line pressure through a hole in the plunger of the valve.

Pilot valves can be hand-operated, or of the solenoid type connected to a time clock, or other signalling device.

The valve is manufactured in five sizes, 1 through 3 in., and furnished with threaded pipe connection in all sizes through 2 in., flanged connection for all larger sizes. *Telsco Fittings Division.*

Check No. 2 On The Time-Saver Card

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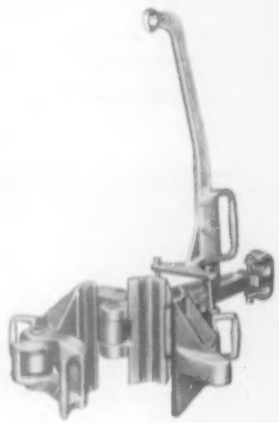
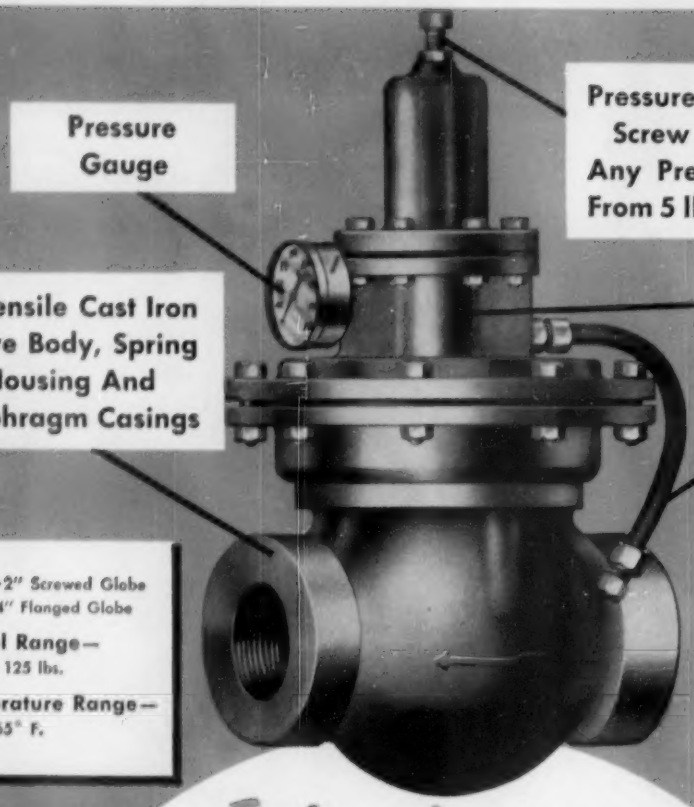


Tong Designed for Slim Hole Drill Tubing

To meet the demand for a safe, efficient tong for handling drill tubing in slim hole programs, the Type BDF drill-tubing tong does not crimp, deform, or bottleneck drill tubing.

Although designed specifically for drill tubing, this new tong also operates perfectly on regular tubing and small-diameter casing. Each of the four die slots contains two 5¾-in. tong dies, making a total of eight dies, with 46 in. of pipe-contacting surface. This large area of die contact ensures a quick, uniform grip which avoids crimping even when used on thin-wall, lightweight tubing.

Actual tests have been made with up to 20,000 ft. lb. of torque on 4½-in. drill tubing, with no deformation or crimping of the tubing. Type BDF tong is available to fit tubing, casing, and coupling diameters from 2⅜ through 8⅝-in. o.d. Size changes are



Pressure Gauge

Pressure Adjustment Screw To Control Any Pressure Range From 5 lbs. to 125 lbs.

Hi-Tensile Cast Iron Valve Body, Spring Housing And Diaphragm Casings

Integral Pilot Controller

Pressure Transmission Tube

Sizes—2" Screwed Globe
3" and 4" Flanged Globe

Control Range—
5 lbs. to 125 lbs.

Temperature Range—
Up to 165° F.

- Pilot Operating Mechanism Machined From Stainless Steel and Aluminum.
- Buna-N Valve Diaphragm With No Center Punching.
- Nylon Reinforced Buna-N Soft Seat Insert.
- Spring Loaded Teflon Packing.
- Stainless Steel Valve Stem.
- Valve Seat Machined Into Valve Body.

Introducing...

The New BS&B Type 73-22

BACK PRESSURE REGULATOR

...with *Integral Controller!*

Here is the ideal Back Pressure Regulator and valve for services where *close regulation* and *complete closure* are required in a single instrument. Its integral controller provides even closer sensitivity to pressure fluctuations than can be obtained with a weight loaded regulator—yet it has a much wider range of adjustment than is possible with a regulator that depends on direct spring loading.

Designed for optimum control on low pressure oil separators, water knockouts, gunbarrels, gas gathering lines and other equipment requiring close pressure control as well as tight shut-off, the BS&B Type 73-22 also works as well, within its pressure limitations, in all gas or air services that require back pressure regulation.

A feature of this regulator is its ability to operate with the dissipation of a *minimum* quantity of the gas or air used in the controller.

Type 73-22 meets 100% the high standards of *quality* and *performance* for which all BS&B Controls have become so famous throughout the industry. If you'd like more details, write to us direct . . . or ask your BS&B Controls Representative.

Controls Division, Dept. 4-A1
84 Sales Centers 40 Stocking Points

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

BLACK, SIVALLS & BRYSON, INC.
7500 East 12th Street • Kansas City 26, Missouri

easily made by changing only one tong-lug jaw. *Web Wilson Oil Tools, Inc.*

Check No. 3 On The Time-Saver Card

●

Gage-Line Brake, Wiper Fit All ½-in. Frames

By applying thumb pressure to the braking lever, the gage weight can be instantly stopped in its descent to the bottom of the tank without injury to hands.

As the oily gage line is reeled to the surface after gage is taken, another lever causes soft rubber rollers to wipe the line clean. Rollers last for months and are easily replaced. Both assemblies are easy to install and weigh about 4½ oz. Rollers or wipers are made of neoprene for long wear. No special tools are required for installation or for replacing rollers. *Don C. Davis.*

Check No. 4 On The Time-Saver Card

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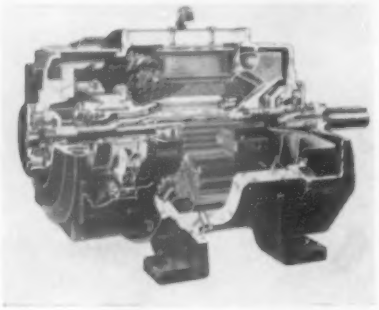


Industrial Motors Feature Fast Accurate Response

Super T line motors are described as producing fast and accurate response. Dynamic response is described by Reliance as the fundamental feature that has been built into the new T D-C motor to meet industry's growing demands for automation. Design also features ruggedness, ability to take full load and overloads, ability to change speed rapidly, ability to maintain torque and tension, and reverse and stop quickly.

The time required for Super T to accelerate to full speed has been cut to half the time that was formerly required. Lower mechanical inertia, lower electrical inertia, and higher commutating ability are responsible for this performance. Super T motors are being produced in the sizes from 20 to 100 hp. A complete range of mechanical enclosures has been developed to assure complete protection under every conceivable operating condition. *Reliance Electric & Engineering Co.*

Check No. 5 On The Time-Saver Card

●

Constant Flow Valve Keeps Rate of Flow to Fine Limit

A new series of constant flow valves maintains the rate of flow of fuel oil or any other nonabrasive fluid within 1 per cent up to 200, 300, 400, 500, 600, or 700 gal. per hour, as desired. Each model will maintain flow rates as low as 10 per cent of maximum. The valves will regulate the flow of fluids with viscosities as high as 250 S.U.v. at operating temperature, static pressures as great as 500 psi., and temperatures as high as 250° F., despite fluctuations in upstream or downstream pressure. Flow level is accurately maintained as long as the fluid viscosity and temperature are constant and the pressure differential across the valve is 40 psi. or higher for maximum flow.

Flow level may be set manually at the valve or through any one of four optional remote adjusting systems specifically designed to operate in conjunction with the valve. These four systems, one hydraulic, one pneumatic, and two electric, may in turn be operated manually or by a pneumatic, or electric signal proportional to temperature, flow of another fluid or a gas, or some other variable. In addition, any one of these adjusting systems may incorporate a feedback potentiometer to develop a voltage proportional to flow through the valve.

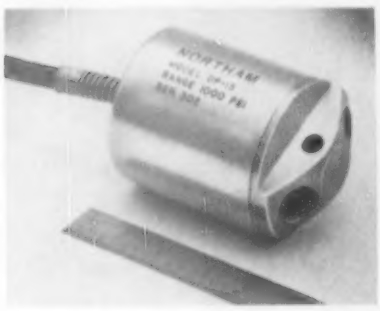
The constant flow valve operates by measuring the pressure drop across an adjustable orifice. This pressure differential is applied across a spring-biased hydraulic cylinder connected to operate a throttling valve upstream from the orifice. If the pressure drop across the orifice does not exactly balance the constant force applied by the spring, the resultant piston action causes the throttling valve to readjust differential pressure at the orifice to the desired valve, and, consequently flow to the preset rate. *Askania Regulator Co.*

Check No. 6 On The Time-Saver Card

●

Transducer Designed for Pressures to 5,000 Psi.

Model DP-15 differential pressure transducer is intended for the measurement of pressure in ranges from ±200 to ±5,000 psi. differential at line pressures up to 5,000 psi. The instrument is indicated for both static and dynamic measurements and will withstand overloads up to 100 per cent of the rated range. The dynamic response permits measurements of transient pressure phenomena involving high-frequency components. The natural frequency ex-



tends from 2,000 cycles per second at the lowest range to 10,000 cycles per second at the highest.

The instrument may be used in laboratory measurement and industrial control applications with indicating, recording, and control systems, adapted to operation with variable reluctance-type transducers.

The construction of Model DP-15 features a pressure-sensing diaphragm integral with stainless-steel body. The natural frequency is determined only by the diaphragm; there are no addi-

a familiar trademark all over the world

When you are in trouble HOMCO can help

When you need help in the oil fields you need it now and you don't have time to call or chase down two or three different outfits. HOMCO has the oil industry's most complete service. One call starts the entire HOMCO chain of supplies and services working for you. From the top of the derrick to the bottom of the hole, HOMCO has the equipment, tools and men to do any job for you—and do it **right.**

Homco SUPPLY Stores carry complete stocks of everything needed in the oil fields and are ready to serve you twenty-four hours a day. In addition, there is a Homco engineer available for your DIRECTIONAL DRILLING problems, an experienced Homco supervisor for your FISHING difficulties, and Homco equipment available for sidewall coring, sub surface surveys, free point indicator and back-off shooting, or any other oil field need. Whenever you call Homco you get the years of experience, knowledge and skill that almost 1000 HOMCO employees place at your service.

DIRECTIONAL DRILLING — CUTTING

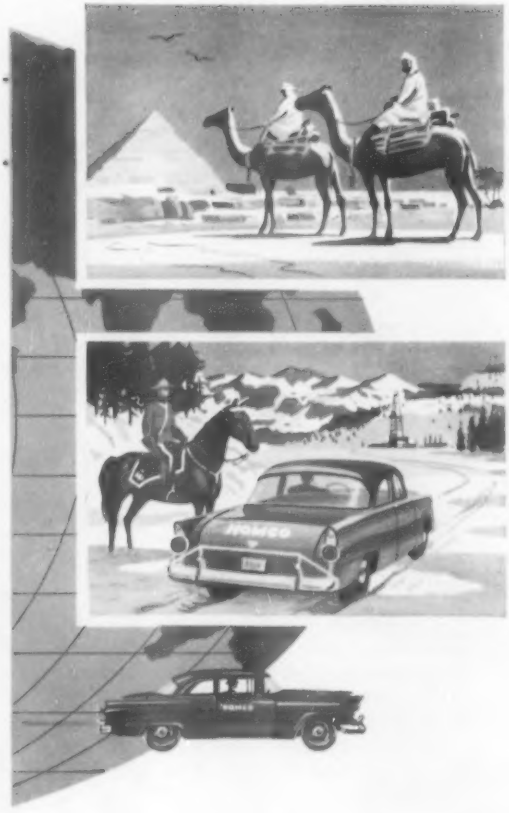
Did you know?

HOMCO

. . . has the most experienced, best trained engineers in the directional drilling field.

. . . has the world's largest cutting and fishing tool organization.

. . . is the world's largest independent oil field supply and service organization.



Did you know that Homco offers all these services — and has the experienced, skilled men to give you fast, expert service anywhere in the oil country?

33 BRANCHES

Directional Drilling Service . . . Sidetracking and Straightening . . . Subsurface Directional Drilling Service . . . Single Shot and Multi Shot Instruments . . . "K" Monel Non-Magnetic Drilling Collars.

Cutting and Fishing Tool Service . . . Overshots, Inside and Outside Cutters, Spears . . . Washover Back Off Tool . . . Hydraulic Pulling Tool . . . High Pressure Pump Unit . . . Impact Jars . . . Combination Jar and Keyseat Reamer . . . Magnetic Fishing Baskets . . . Wash Pipe, Drill Pipe and Tubing Rentals . . . Electrical Well Services . . . String Shooting . . . Electronic Free Point Indicator Service . . . Sidewall Coring Service.

Skid Mounted Pumps, Engines and Compressor Units . . . Tool Houses . . . Homco Drilling Muds and Chemicals . . . Homco Mud Miser.

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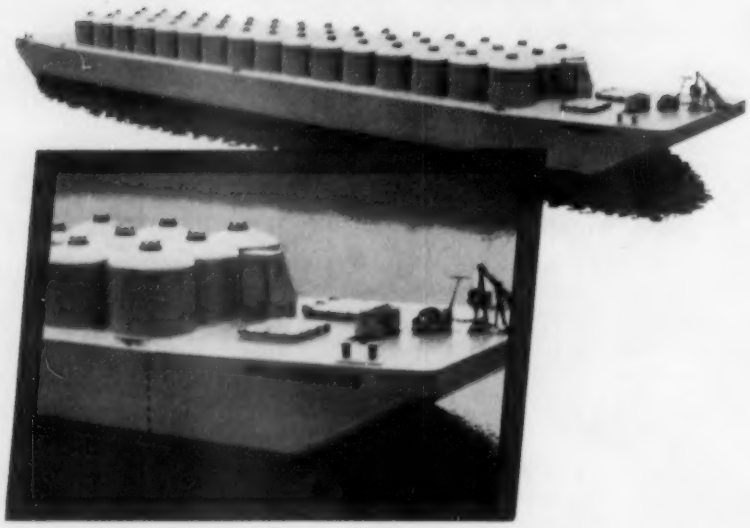
30 DAYS FROM START TO FINISH...



Yet Higgins Pleased a Most Exacting Customer

Halliburton Oil Well Cementing Company needed two bulk cement barges—needed them *fast*, and wanted them *perfect*. The first was built in 30 days, including fabrication of the 48 pressure type tanks. Each of these tanks is 9′ in diameter. Each had to be assembled on special jigs. Each was described as:

"Unusually well fabricated, with perfect symmetry and uniformity of seams."

This barge typifies Higgins versatility, and pride of workmanship. Higgins delivers any job *right* on time.

Higgins

DRILLING BARGES • DREDGES • BARGES • QUARTER BOATS • TUGS • WORK BOATS • COMMUNICATION CRAFT • DRILLING STRUCTURES • PERSONNEL BOATS • PLEASURE BOATS • SEISMOGRAPH BOATS BULK-TYPE CARGO BARGES • SWAMP SKIPPERS • TANK BARGES • ALSO MARINE REPAIRS OF ALL TYPES

tional elements to lower the natural frequency or to produce spurious modes of vibration. The electrical pick-off elements are potted with epoxy resin in plugs which are imbedded in the body. The weight is 12 oz. *North American Instruments, Inc.*

Check No. 7 On The Time-Saver Card

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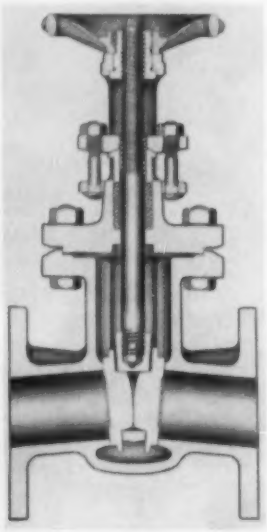


Gate Valves Feature Split-Wedge Disk

A completely new line of alloy gate, globe, and angle valves feature the split-wedge disk design in the gate valves and an improved disk-stem connection in the globe and angle valves.

Materials in which the new valves are regularly available are Crane 18-8S Mo stainless steel and Craneloy 20 high-nickel, high-chromium stainless steel. Teflon packing is used in all the valves.

The split-wedge disk in the gate valves is made up of two identical, circular disks placed back-to-back in a carrier. The disks have a convex trunnion on the back and an integral circumferential flange which bears on guide slots in the valve body. Since the seating load is uniformly distributed over both disks, excessive force is not required for tight seating and there is no danger of buckling of the disks. This uniform pressure, plus freedom of the disks to rotate, is highly effective in reducing seat wear and preventing galling of seating surfaces.

In the new globe and angle valve disk-stem construction, the stem extends much farther into the disk, with a minimum amount of radial clearance. Chattering of the disk is eliminated and seat wear is greatly reduced. All the valves are furnished regularly with all bolting of stainless steel.

TIMKEN® bearings on fastline sheave defy thrust on Moore 133 ft. mast

LEE C. MOORE CORPORATION mounts the 56" fastline sheave of its 133' Cantilever drilling mast on Timken tapered roller bearings to provide load-carrying capacity to spare, maintain alignment.

SINCE Lee C. Moore Corp. mounted the 56" fastline sheave of its 133 ft. special service cantilever drilling mast on Timken® tapered roller bearings, thrust loads are no problem.

Tapered construction lets Timken bearings take both thrust and radial loads in any combination. In this application Timken bearings keep the fastline sheave in positive alignment. And because of full line contact between rollers and races, Timken bearings have the capacity to take extra-heavy loads with ease.

Timken bearings practically eliminate friction. They're designed by geometric law to give true rolling motion and manufactured to live up to their design. Timken bearings are made with the highest quality steel obtainable. We make it ourselves—to be sure—the only U. S. bearing manufacturer that takes this extra quality step.

For all the oil field equipment you build or buy, specify bearings with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭
BEARING TAKES RADIAL ⟊ AND THRUST ⟊ LOADS OR ANY COMBINATION ⟊

Southwest

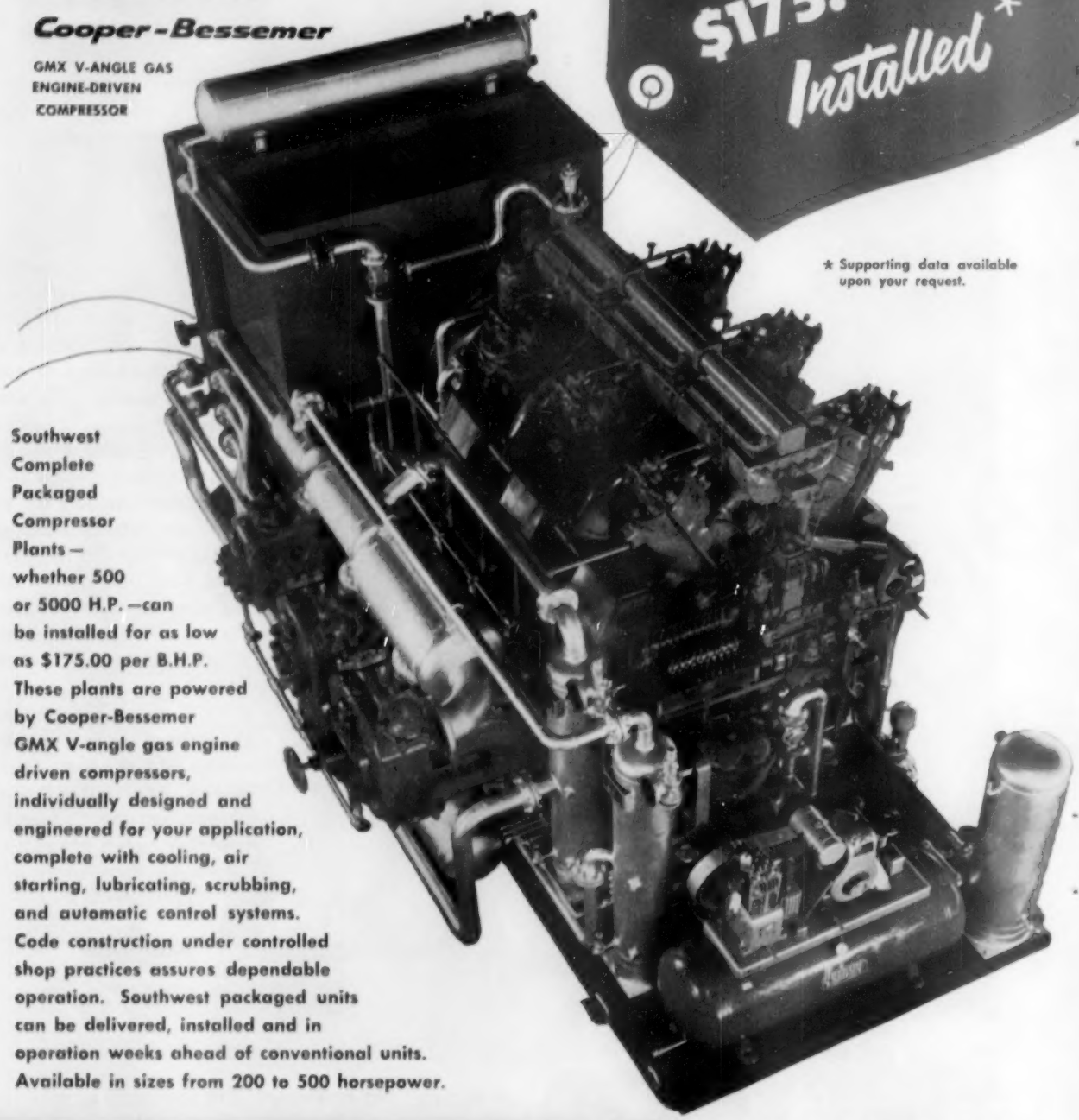
PACKAGED COMPRESSOR PLANTS

Cooper-Bessemer

GMX V-ANGLE GAS ENGINE-DRIVEN COMPRESSOR

AS LOW AS $175.00 per B.H.P. Installed *

* Supporting data available upon your request.



Southwest Complete Packaged Compressor Plants — whether 500 or 5000 H.P. — can be installed for as low as $175.00 per B.H.P. These plants are powered by Cooper-Bessemer GMX V-angle gas engine driven compressors, individually designed and engineered for your application, complete with cooling, air starting, lubricating, scrubbing, and automatic control systems. Code construction under controlled shop practices assures dependable operation. Southwest packaged units can be delivered, installed and in operation weeks ahead of conventional units. Available in sizes from 200 to 500 horsepower.

BE SURE TO SEE OUR COMPLETE PACKAGED PLANT ON EXHIBIT AT THE PERMIAN BASIN OIL SHOW.

SOUTHWEST INDUSTRIES, INC.

Post Office Box 7773 Houston 7, Texas

What's New... Use the handy Time-Saver Cards

Crane is offering the new valves in screwed ends, sizes ½ to 2 in. inclusive, and in flanged ends, sizes ½ to 6 in. inclusive. *Crane Co.*

Check No. 8 On The Time-Saver Card

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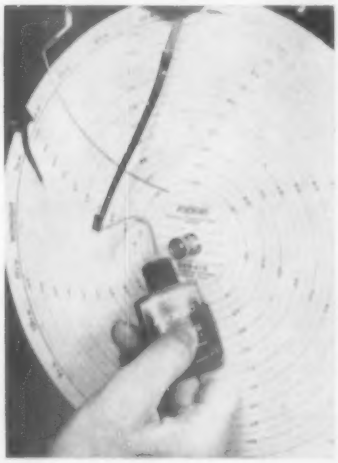

Instrument Ink Furnished In Squeeze Dispensers

A new general purpose ink has been developed for use with Foxboro's complete line of industrial recording instruments. Designated as Type 1500 ink, it was especially formulated for use with Foxboro pens and Humitex charts to produce the sharpest possible record of a process variable.

Containing no sediment, the new ink is smooth flowing, will not clog the pen, and dries quickly without feathering the chart. Special properties give it a wide range of performance under varying industrial conditions. It is rated for high temperature, and can also be used down to 0° F.

For convenience in inking the pen, ink is furnished in a newly designed, 1-oz., polyethylene squeeze bottle. An exclusive plastic capillary-tube and filter assembly enables the user to pinpoint a precise quantity of ink on the pen without dripping it on chart or instrument. Box pens can be tube-filled through the point and need no additional priming prior to use.

The bottle is quickly sealed for leakproof storage by inserting the tip of the filling tube into a receptacle in the closure. The new ink in the unbreakable plastic dispenser is furnished in red, violet, blue, green, and black. *Foxboro Co.*

Check No. 9 On The Time-Saver Card

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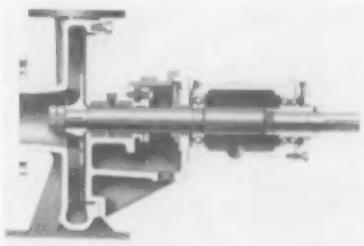


Chempump with Canned Rotor Made in New Range

Designated the Model CHS series, the new 5 and 7½ hp. Chempumps offers users leakproof pumping at heads to 195 ft. and capacities to 300 g.p.m.

Pumped fluid is allowed to enter the enclosed rotor chamber, providing automatic lubrication of the bearings. Rotor and impeller are an integral unit and the only moving part. The pumps are guaranteed not to leak. The Model CHS series is available in cast iron, stainless steel, Monel or Carpenter-20 construction as standard. Temperature and pressure limits are 450° F. and 150 psi. with standard models. Much higher limits are possible with special models. *Chempump Corp.*

Check No. 10 On The Time-Saver Card

●

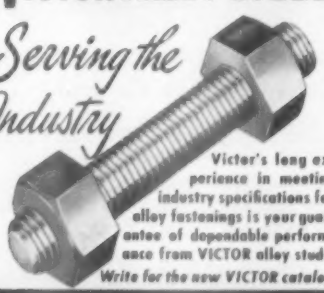
Gas Cleaner Built for Limited Space Needs

A new type of gas cleaner is lower in height than a conventional scrubber and available in smaller capacity sizes. The cleaners are designed for district gas regulating and distribution points where height is a limiting factor.

Sizes range from 8 to 30 in. nominal diameter. The smallest conventional cleaner is 12-in. diameter. The maximum gas capacities at 30 psig. run

VICTOR ALLOY STUDS

Serving the Industry



Victor's long experience in meeting industry specifications for alloy fastenings is your guarantee of dependable performance from VICTOR alloy studs.

Write for the new VICTOR catalog.

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Cleanout

TAP and DIES

by Baird

Patent No. 2110618

2" to 4" Plain and Eue Round and V-Thread

For field use in cleaning up smashed threads, removal of dirt and contamination on collar or tubing. The tap end is relieved at each land to assist in removal of gyp.

Always Available Through Your Supply Store

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To design new oil-refineries and chemical plants. Please send your resume to our Personnel Department. Your letter will receive immediate and confidential attention.

C F BRAUN & CO

Engineers

Constructors

ALHAMBRA, CALIFORNIA

What's New... Use the handy Time-Saver Cards

from 7,000 up to 205,000 cu. ft. per hour, with more capacity at higher operating pressures. The new cleaners can be constructed for any pressure required.

Heights of the conventional cleaners range from 7 ft. 3 in. for the 12-in. size to 10 ft. 10 in. for the 30-in. unit. Comparable heights of the new low-height cleaner are 4 ft. 2 in. for the 12-in. size and 6 ft. for the 30-in. size.

No sacrifice has been made in scrubbing efficiency with the new design, since the same oil-contacting principle is used to maximum advantage. The mist-extracting system is of entirely new design, fully tested, and of higher efficiency than any previously available. *Blaw-Knox Co.*

Check No. 11 On The Time-Saver Card

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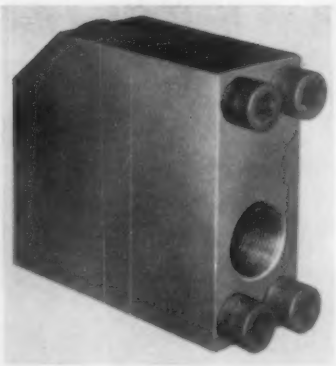
Ball-Type Check Valve Has Full-Opening Passageway

Designed to accommodate paraffin control plugs in high-pressure lines, the



ball-valve member leaves the seat and moves out of the fluid passageway to provide straight unobstructed flow allowing free movement of paraffin control devices.

Constructed to withstand high-pressure service encountered in hydraulic pumping systems the check valve can be installed on the downstream lines at the manifold or header to provide immediate checking of back flow during the plug-insertion operation. The streamlined passageway eliminates chipping or distorting and promotes positive movement of soluble plugs even at the lowest flow rates. *Well Controls, Inc.*

Check No. 12 On The Time-Saver Card

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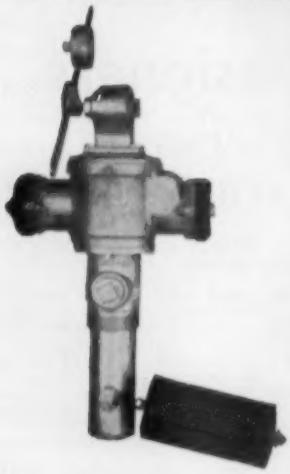

Those endless steps to check tanks are now unnecessary. With an Enardo semi-automatic fill valve, the cocking lever mechanism is also a visual indicator of fluid movement and may be seen from the ground. The lever is easy to cock from the catwalk, just push end of weight lever down and your visual indicator is set. Lever weight up, tank filling; lever weight down, tank full and oil routed to next tank.

Optional equipment on the semi-automatic fill valve is a switch that will shut down the pumping engine, actuate a light on a central control panel, or in night operations, turn on a light at the tanks.

Find out how this process correlates with the Enardo Vapor Control system, by eliminating excessive opening of your hatches.

Write Enardo today for further information on the Enardo semi-automatic fill valve. Bulletin #7

ENARDO manufacturing company

BOX 1647 • TULSA, OKLAHOMA

Adjustable Air Regulator Offers Precise Control

A reliable, drift-free source of clean, dry air for instrument service or air-regulated equipment is provided by a new adjustable output regulator. Model 55 regulator has a flow capacity of up to 15 cu. ft. per minute, maximum inlet pressure of 150 lb., and automatic relief if the regulated pressure exceeds the preset value.

Efficient water separation, as well

The Family's Grown to 58

It seems like a long time ago that Bethlehem had its first little group of supply stores, and we can't help thinking how times have changed. When we look at photographs of those original layouts and compare them with today's big stores, like the one shown here, it's a reminder that the oil business has come a long way.

Because if the industry hadn't grown, our business wouldn't have, either. We know that each new Bethlehem Supply store is a sign of progress, a marker in our own family history and that of the industry at large.

All of the 58 Bethlehem stores—the total today—are stocked with the latest, most modern types of equipment and supplies. At practically a moment's notice these stores can furnish you valves and fittings, hose, packing, gaskets, paints and hardware, belting, pipe, drilling equipment, pumping units, wire rope, sucker rods, bottom-hole pumps, or just about anything else you want. As long as you're close to a Bethlehem store, it's needless to carry large, expensive inventories. Bethlehem carries your field supplies in stock.

Come in and meet our people, won't you? See what they have to offer. They're the friendliest folks on earth, and you can rely upon them to work with you all the way.

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

West Coast Headquarters:
Los Angeles, Calif.

Export Distributor:
Bethlehem Steel Export Corporation,
25 Broadway,
New York, N. Y.

as improved over-all performance, and reduced maintenance are accomplished by a large-capacity drip well and resinous bonded filter element 35 times the area of standard ¼-in. pipe. Entire unit is easily cleaned and drip well is drained by a simple push-button valve.

The regulator is compact (3⅜ in. in diameter by 7⅛ in. high with adjusting screw fully extended), lightweight and ruggedly built. It may be panel, bracket, or line-mounted. Unit is furnished with or without pressure gage. *Kendall Controls Corp.*

Check No. 13 On The Time-Saver Card

●

Rapid Shift Transmission Made for Quick Reversal

A new rapid shift transmission is designed for quick reversal of output rotation without interruption of the power source.

Controlled by a single lever which provides quick and easy shifting into forward, reverse, or neutral, the new model RS-265 has a friction clutch factory-set to slip at approximately 265 lb.-ft. of torque. It can be adjusted to higher or lower capacities.

This new transmission was designed for use with oil field and material handling equipment and winches. The friction clutch permits driving winches rated up to 45,000-lb. capacity.

Speed ratios are 1.00 to 1 in forward rotation and 1.29 to 1 in reverse. Maximum recommended input horsepower at 500 r.p.m. is 30 hp.; maximum recommended input speed is 1,500 r.p.m. *Tulsa Winch, Division of Vickers, Inc.*

Check No. 14 On The Time-Saver Card

●

Drain and Grounding Device Eliminates Spark Dangers

An explosionproof electrostatic drain and grounding indicator to eliminate dangers of explosion caused by electrostatic sparks is for use on gasoline truck-loading racks, tank-car loading and unloading operations, and any place where explosive or flammable objects are loaded or unloaded. The range of operation far exceeds the requirements of the N.F.P.A. for grounding safety.

The unit is used to actuate a visual alarm or may be connected to make pump start-up impossible when a danger condition exists. *Nelson Electric Manufacturing Co.*

Check No. 15 On The Time-Saver Card

●

Geophysical Cables Have Extruded Rubber Jacket

Rubber-jacketed, nylon-insulated geophysical cables, developed for use in extreme hot or cold temperatures, are compounded from 60 per cent natural rubber to provide the long life, toughness, and dependability required in seismic application. The cable is manufactured exclusively for the geophysical industry. *Vector Manufacturing Co.*

Check No. 16 On The Time-Saver Card

KENYON
Heat Insulation Specialists
Kenyon provide a complete thermal insulation service to the oil industry, including technical advice on thermal insulation specifications, and finishes for all conditions. Supply of materials, application, supervision on sites throughout the world.
Service Piping to Power Plant
Photograph by courtesy of The Vacuum Oil Company, Coryton Refinery, England.
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KH 161.

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

New Luncor, a comprehensive, completely illustrated, four-page circular describes all-molded P.V.C. valve and fittings. Luncor valves and fittings have remarkable resistance to corrosive chemical action and resist most chemicals used in industry. The molding process gives the P.V.C. material exceptional strength, protects its natural corrosion resistance, and substantially reduces manufacturing costs. *Lunkenheimer Co.*

Check No. 17 On The Time-Saver Card

●

Turbocharged Model TLA Compressors. Three models, 2,000, 2,350, and 3,300 b.hp., 2-cycle gas-engine-driven compressors are described in 22-page bulletin 134-6-1-54. Two-color schematic drawings illustrate a new concept in compressor design that features economical installation and operation. An annotated cutaway illustration points out salient features of these units. *Clark Bros. Co.*

Check No. 18 On The Time-Saver Card

●

Retreatment With Retarded Acid Increases Production. This is a case history on an actual well in an area where conventional treatment had failed to increase production. The fact sheet describes the condition of the well, the method of treatment, and the results obtained from treatment with retarded acid. *Dowell Incorporated.*

Check No. 19 On The Time-Saver Card

●

Carbon and Alloy Cast Steel Sheaves. In addition to explaining the materials from which these sheaves are cast, this four-page brochure describes the cable-saver grooves in these sheaves as giving longer service life to both cable and sheaves. Catalog No. 22 also contains information on a complete line of wire-rope fittings. *Farrell-Cheek Steel Co.*

Check No. 20 On The Time-Saver Card

●

New Edward Condensed Catalog. Valve users and buyers can easily obtain data

Helping to Turn Hot into Cold

Pacific TYPE CT VERTICAL CENTRIFUGAL PUMPS

Developed to combine simplicity and accessibility with essential strength and sturdiness, Pacific CT Pumps provide continuous cooling tower operation with sustained efficiency over long periods of time. Pumps are custom built to your requirements from any material of commercial availability.

Pacific Pumps inc.

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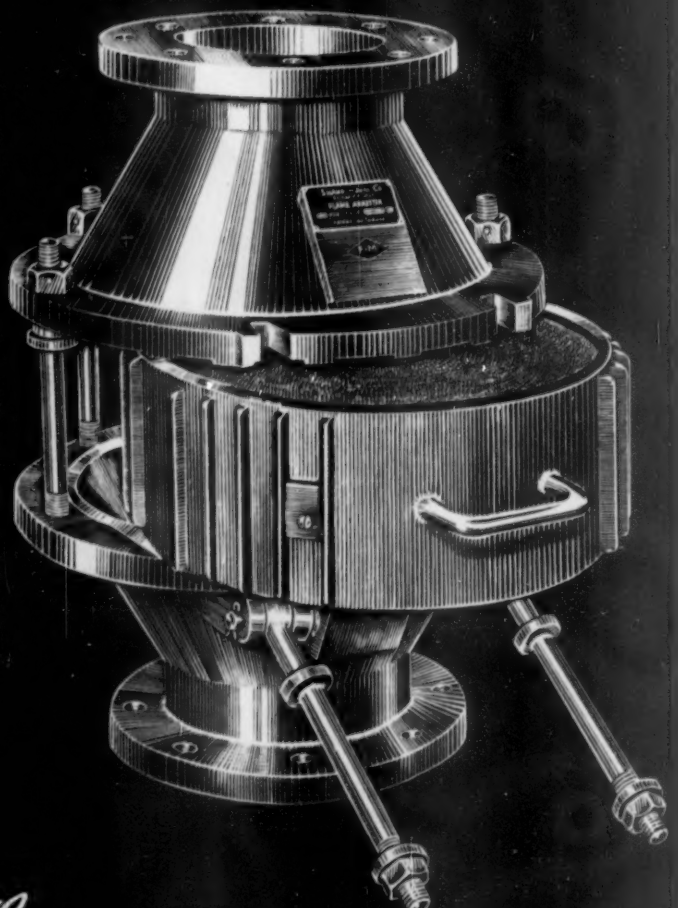
Send for New Bulletin 100-A

S&J FLAMEX *Does just that!*

THE Shand & Jurs "Flamex" is the flame arrester that positively X's out the chance of flame endangering tank contents. The "Flamex" is available in many different combinations of metals. It can meet any special requirements in the Oil, Chemical and Petro-Chemical Industries. Used in the same manner and places as regular flame arresters, the S&J "Flamex" will provide longer useful life, lower maintenance cost, and in the long run, GREATER SAFETY.

The "Flamex," identified as Fig. ST-4300, incorporates a spirally wound tube bank of alternate flat and corrugated metal sheets around a solid core of like material. The passages thus formed run parallel to normal gas flow. For maximum safety, end section faces are precision ground, assuring positive, tight seats. Quick removal of the bank for inspection or cleaning is accomplished by unscrewing one or more clamp bolts which swing down. The other bolts are used to jack the ends apart for easier bank removal.



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REPRESENTATIVES:
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MONTREAL: Lytle Engineering Specialties, Ltd., 360 Notre Dame St., W.
TORONTO: Lytle Engineering Specialties, Ltd., 85 Richmond St., W.
VANCOUVER: P. D. McLaren & Son, Ltd., 3277 Main Street
CARACAS: Sinclair Spence, C.A., Edificio Galipan
ENGLAND: Whessoe, Ltd., Sales: 25 Victoria St., London, S.W. 1
Whessoe, Ltd., Works: Darlington, County Durham

on valves for a wide variety of applications by using the simplified cross-index in condensed catalog 105. Included are dimensions and illustrations describing these Rockwell-built valves. Among these are nonreturn (stop-check) valves, globe and angle-stop valves, pressure seal design, angle univalves, and small size globe valves designed for chain or extension operation in vertical lines. Also included is the mudline valve which is suitable for abrasive fluid applications. *Edward Valves, Inc.*

Check No. 21 On The Time-Saver Card

●

Type A Casing Supports. Operating features and design of National Type A casing supports are illustrated in Bulletin 432. Specifications cover 12 sizes of 65,000 to 160,000-lb. slip-load capacity for wells without pressure outside of the suspended string. *National Supply Co.*

Check No. 22 On The Time-Saver Card

●

Selection and Maintenance of Stainless-Steel Valves. Seventy-five questions and answers designed to help in the selection and maintenance of stainless-steel valves make up the body of this technical paper prepared from questions raised at valve clinics. The article covers selection of materials, data on new materials, service and installation problems, and information on valve repair. *Cooper Alloy Foundry Co.*

Check No. 23 On The Time-Saver Card

●

Combustion-Gas Turbines. Combustion-gas turbines for power generation and mechanical drive are described in a revised bulletin designated GEA-5516B. Gas-turbine, steam-turbine cycles, mechanical-drive applications, design features, control and governing, generators, tables of characteristics, and dimensions and weights are among subjects covered. Models included are the simple-cycle, single-shaft; simple-cycle, two-shaft; and the regenerative-cycle, two-shaft units. The 28-page 2-color bulletin is profusely illustrated with photos, diagrams, and sketches. *General Electric Co.*

Check No. 24 On The Time-Saver Card

●

Vertical Multistage Pumps, a new 12-page, 2-color bulletin includes sectional drawings, dimensions, and installation views of the pumps in service. These units, designed for boiler feed, refinery, process, and booster service, are available for all pressures up to 1,500 psi.

Now! Couple grooved pipe with

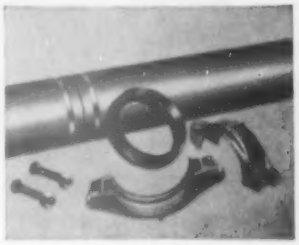
new economy

new speed

new ease

new GRUVAJOINTS

lightweight couplings for grooved pipe



GRUVAJOINTS — for grooved pipe systems carrying pressures up to 500 psi — cost considerably less than ordinary grooved pipe couplings. You get substantial freight savings, too, because GRUVAJOINTS weigh up to 45% less than conventional couplings.

Light and trim, GRUVAJOINTS are easy to apply and remove; easy to store; can be used over and over. They are made of malleable iron for 2", 3" and 4" pipe — protected with green rust inhibitor.

The GRUVAJOINT sealing gasket is interchangeable with those in GRUVAGRIPS (standard weight grooved pipe couplings). GRUVAJOINTS couple perfectly with GRUVAGRIP FITTINGS.

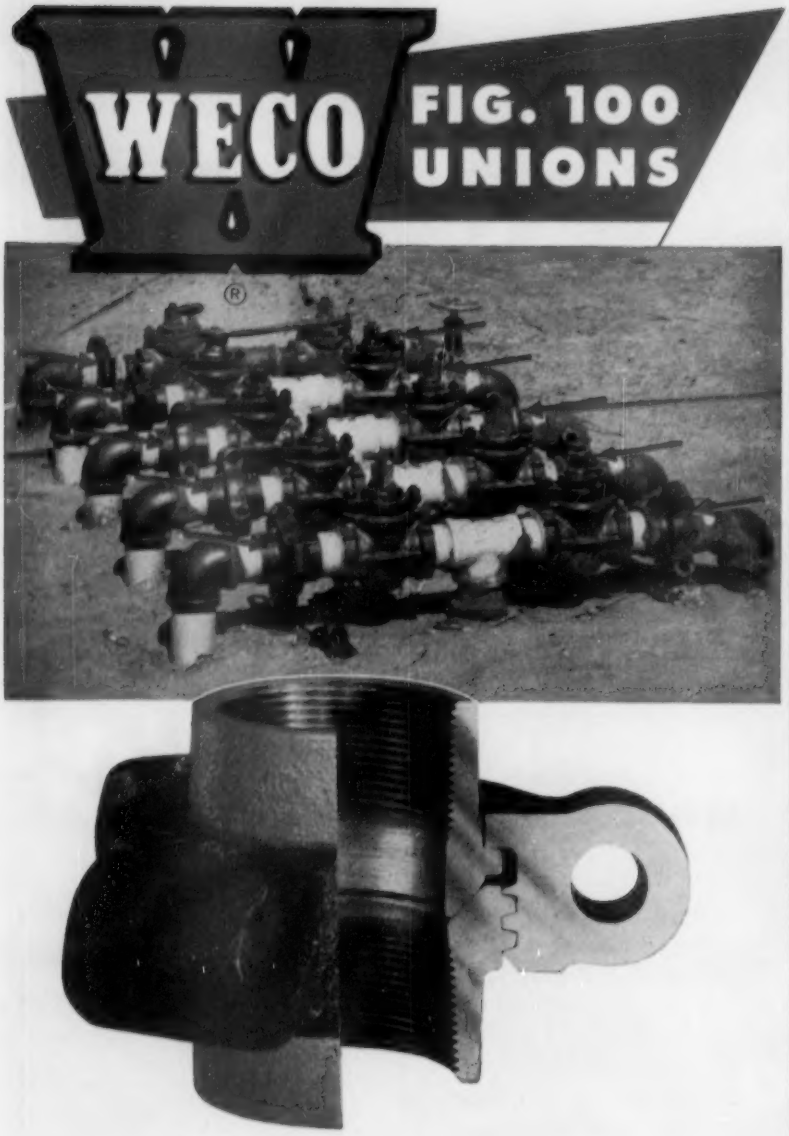
See new GRUVAJOINTS this week at your supply store!

FREE FOLDER

Write today for illustrated folder describing GRUVAJOINTS and other G-B pipe coupling products — GRUVAGRIPS, GRUVAGRIP FITTINGS and ROLA-GRIPS (for plain end pipe). Ask for folder CCF.

Gustin-Bacon Manufacturing Company

210 West Tenth Street Kansas City 6, Missouri



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simplify make-up,
assure leak-proof union connections,
provide easy break-out for service,
and will give years of dependable,
trouble-free service.

PESA

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with capacities to 3,500 g.p.m. The simplicity of design and self-contained construction of the pumps allows easier installation in less space, better operation at a lower cost, and less time-out for maintenance. The complete mechanical balance, careful selection of materials, and the segmented inner-casing assembly are a few of the many refinements that add up to high overall operating economy. *Ingersoll-Rand Co.*

Check No. 25 On The Time-Saver Card

●

Milvaco Valves and Fittings. A new comprehensive catalog covers the complete CO line of valves and fittings for the oil industry. The catalog illustrates and describes all sizes and types of valves and fittings, such as hose-nozzle valves, check valves, truck-tank faucets, manifold valves, foot valves, flanges, and couplings. Over 120 different kinds of valves and fittings in more than 230 different sizes and types are listed in the catalog. Ten convenient tabbed dividers in the catalog make it easy to select the proper valve for any application. Thirty-two pages of renewals parts and an eight-page section containing roughing-in dimensions are also included in this thorough catalog. A 16-page price list is included with the catalog. The catalog is in a handy-to-file binder cover with a prominent name identification on the backbone of the cover. *Milwaukee Valve Co.*

Check No. 26 On The Time-Saver Card

●

Single-Stage Steam-Jet Vacuum Pumps. High-vacuum gas handling without moving parts are features of single-stage, steam-jet vacuum pumps described in Bulletin 5-E. This bulletin discusses application, construction, and operation of the equipment, and includes performance data and sizing tables. Operating instructions are included as well as numerous applications of process industries. Bulletin E-5 discusses pumps ranging from maximum air-load capacities of 1.7 to 8,650 lb. per hour. Vacuum pumps are made in cast iron, bronze, steel, and corrosion-resistant models of Haveg and carbon. *Schutte & Koerting Co.*

Check No. 27 On The Time-Saver Card

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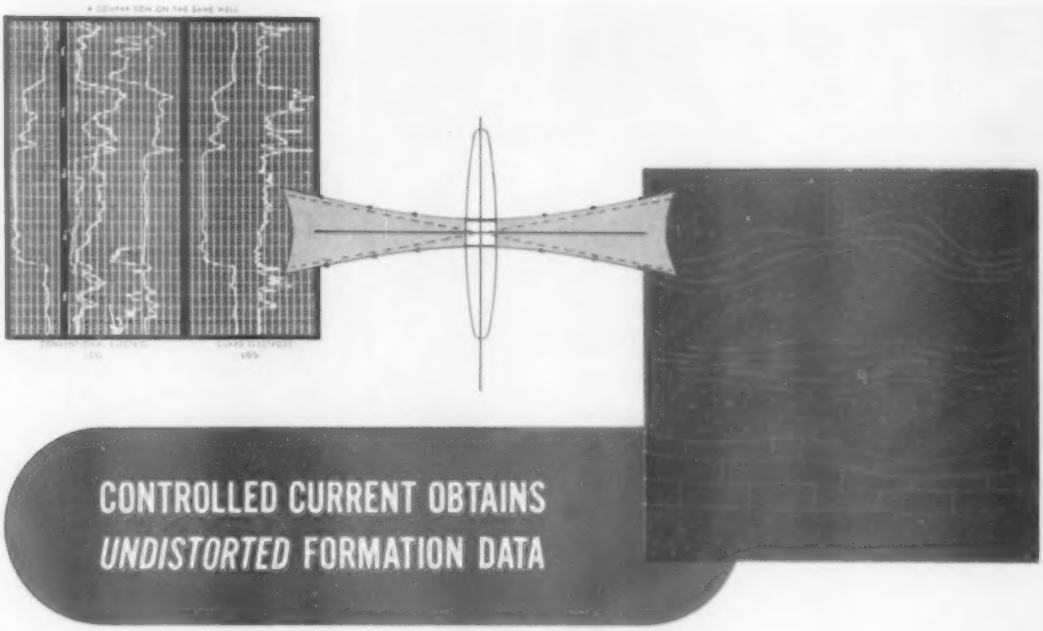
Indicating, Recording, and Controlling Instruments. Designated Publication GL-1, a new four-page bulletin summarizes the Gotham line of indicating, recording, and controlling instruments in text and photographs. Covered in the bulletin are various types of in-



CONTROLLED CURRENT OBTAINS *UNDISTORTED* FORMATION DATA

GUARD LOG ELIMINATES DETRIMENTAL ANOMALIES OF CONVENTIONAL SYSTEMS

Reversals, lags, plateau area and shadow zones—the accuracy-destroying distortions found in all conventional lateral curves —are completely eliminated by the *controlled current* features of Halliburton's Guard Electrode system. With the detailed accuracy of the Guard Log, you can now make more exact estimates of production in beds of critical thickness and in pay zones immediately under hard streaks or lignite beds.

All current, which is forced out in a thin disc shape normal to the axis of the bore hole, penetrates the formation opposite the electrode without being influenced by variations in adjacent formations. A single measuring electrode, located between two relatively long equipotential electrodes, limits responses to a narrow zone that provides sharper lithologic detail *and* extensive depth of investigation.

In salty mud wells, in erratic lithology, in dense sandstone and limestone formations, the extreme accuracy of the Guard Electrode system provides the only effective method for obtaining resistivity values that closely approximate R_T. Learn how Halliburton's Guard Log can give you important assistance for your studies of correlation, fluid interpretation and formations. Call your local or district office of the Halliburton Oil Well Cementing Company.

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OIL STATES EQUIPMENT COMPANY
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Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

dustrial thermometers, in ranges from —40° to +950° F., dial thermometers from —300° to +1,200° F. Recorders for pressure, temperature, and humidity are briefly described and illustrated. Pressure recorders included cover ranges from 30-in. vacuum to 50,000 psi. Temperature recorders cover ranges from —300° to +1,200° F. Humidity recorders use wet-dry bulb system and incorporate the convertible water box. The bulletin also covers portable running time-temperature recorders, electric - recording controllers and alarms, pneumatic off-on indicating controllers, and pneumatic proportional recorders for 1 to 100 per cent proportional band. *United States Gage, Division of American Machine & Metals, Inc.*

Check No. 28 On The Time-Saver Card

●

Spur-Gear Hoist. An eight-page, two-color bulletin describes a line of spur-gear hoists. Bulletin YC and YCT includes pictures, cutaway drawings, descriptions, and specifications of the entire YC and YCT lines, making a total of 62 different sizes and models with capacities from ¼ to 25 tons. In addition to standard single and multiple-chain units, models for specialized applications are shown. Among these are low headroom, clevis-connected, and extended hand-wheel hoists. *Coffing Hoist Co.*

Check No. 29 On The Time-Saver Card

●

Continuous Automatic Blending of No. 5 Fuel Oil. This application memo, with diagrams and descriptions, illustrates the manner in which a newly developed, two-component blender automatically delivers a uniform blend of No. 5 fuel oil directly into tank trucks, tank cars, ships, or storage. The desired blend may be duplicated with accurate uniformity for any number of batches and produced as needed in much less time and at lower cost than is possible by manual methods. *Proportioneers, Inc.*

Check No. 30 On The Time-Saver Card

●

Tight-Closing, Rubber-Seat Butterfly Valves. Bulletin 650-L1 contains information on butterfly valve advantages, sizes, pressures, velocities, operators, and positioners; show general arrangement dimension, prints of various size valves with manual, electric, hydraulic, and pneumatic operators. In addition, it contains photographs and detailed descriptions of each component. *Builders-Providence, Inc.*

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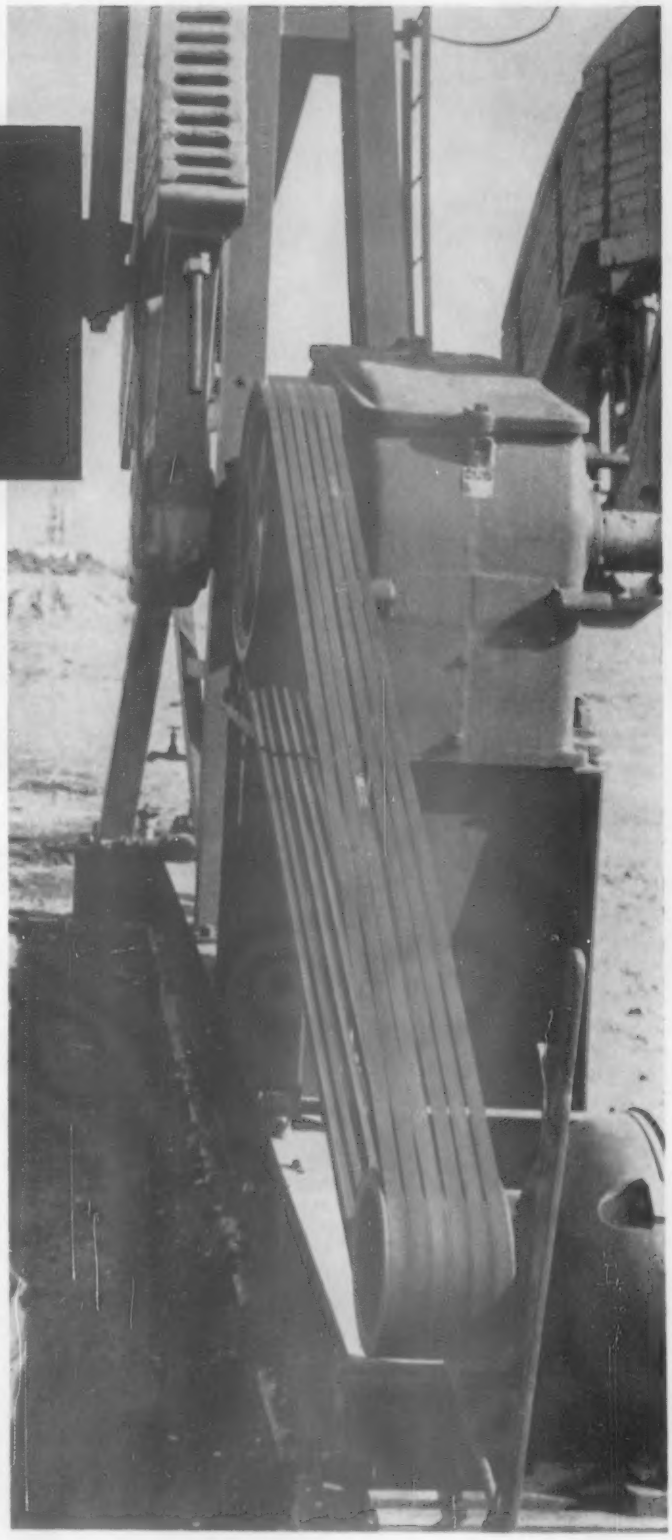
"Yes, It's IN STOCK"



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Yes, whether you require V-Belts in individual sizes or matched sets, Rotary Drilling Hose, Vibrator Hose, Mud Pump Suction Hose, or any other Republic Rubber Oil Industry Product—call your local Republic Rubber Distributor. He has it in stock.

Stocked in the Mid-Continent Area by JONES & LAUGHLIN STEEL CORPORATION, Supply Division P.O. Drawer 2481, Tulsa 2, Okla. and the J & L Store in YOUR field.

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LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

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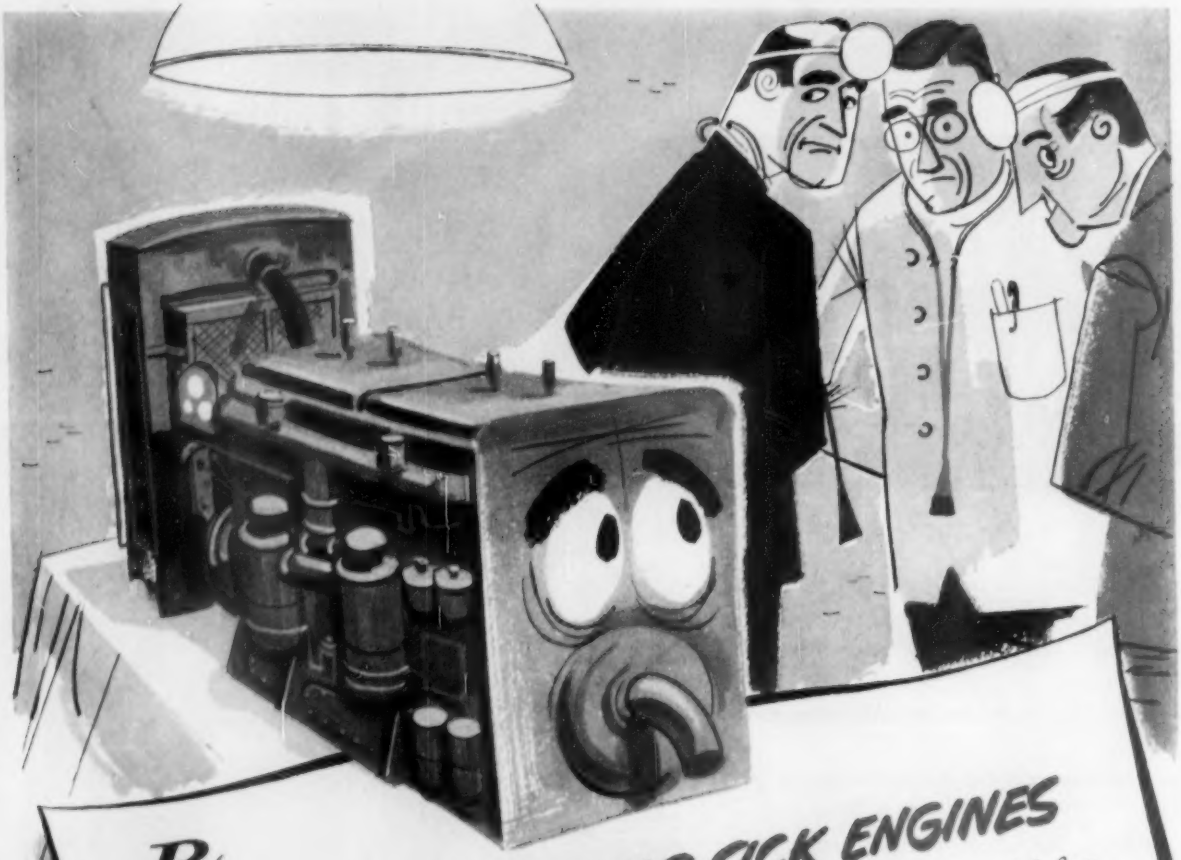
Stocked on the West Coast by HENDRIE BELTING & RUBBER CO. 405 Towne Ave., Los Angeles, Calif. PACIFIC COAST RUBBER COMPANY 51 Main St., San Francisco, Calif.



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Send them home to one of the 11 completely equipped Waukesha Sales & Service, Inc. branches near you, for complete expert service

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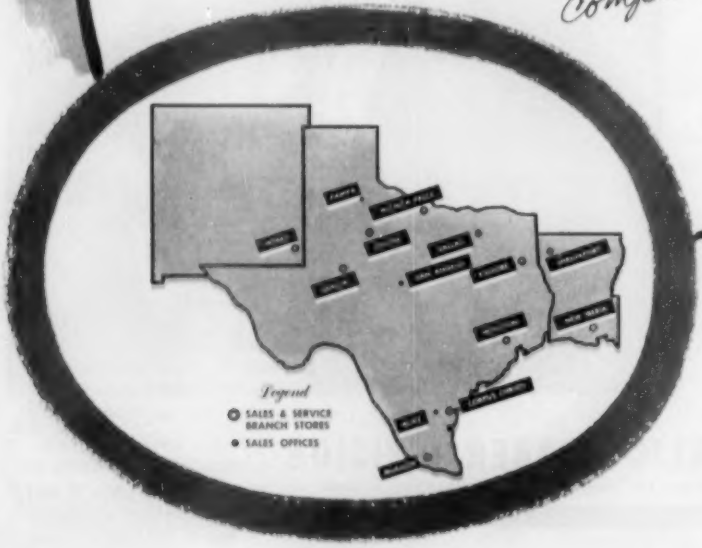

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EQUIPMENT MEN . . . in the News

Worthington Promotes Two Key Sales Officials

Walther H. Feldmann, vice president in charge of sales of Worthington Corp. for the past 4 years, has become execu-

W. H. FELDMANN

T. J. KEHANE

tive vice president of the corporation, it has been announced by the board of directors. He succeeded Edwin J. Schwanhausser whose election as president of Worthington had been announced earlier.

Feldmann joined Electric Machinery Manufacturing Co. of Minneapolis in 1922, rose to vice president and general manager in 1940 and president in 1944. Electric Machinery became a subsidiary of Worthington in 1944 and Feldmann was made vice president in charge of sales of Worthington in 1950.

Thomas J. Kehane, assistant vice president and general sales manager, will succeed Feldmann as vice president in charge of sales. Kehane has been with Worthington since 1915.

Guiberson Occupies New Rubber Plant Addition

Guiberson Corp., Dallas, has announced completion and occupancy of a new rubber-plant addition which more than doubles the former working area. The original building was remodeled and integrated with the new addition to form a unitized plant. An air-conditioned laboratory allows extremely accurate checking of physical properties in the numerous natural-rubber and synthetic-rubber compounds developed by Guiberson for oilfield use.

For many years Guiberson has compounded and molded all rubber elements used in Guiberson products and recently offered other manufacturers the benefit of its experience and facilities on a custom basis. Wide spread acceptance of this service plus increasing demand for Guiberson products made the expansion mandatory according to Harry S. Zane, Jr., sales manager of the Dallas corporation. Complete custom service from mold design to finished product is now possible.

Baker Licenses German Firm To Make Oil Tools

A contract covering the manufacture of Baker oil-field equipment in Germany has been concluded between Fagro G.m.b.H., Hannover, Germany, agent of Baker Oil Tools, Inc., Los Angeles and Celler Maschinenfabrik, Gebrueder Schaefer. Fagro G.m.b.H. has acquired the exclusive right to manufacture through Celler Maschinenfabrik and to sell by license specified items of Baker equipment. Items included in the agreement are: Shoes, collars, cement retainers, retainer bridge plugs, and casing bridge plugs. The manufacture of these licensed products will be currently supervised by special engineers of Baker Oil Tool, so that conformity with the original products is guaranteed. Baker's chief engineer has arrived in Germany in order to prepare the start of operations.

To bridge over the time required for preliminary work before the manufacture may be started, Fagro G.m.b.H. has established a store of Baker cement retainers and bridge plugs, which will be currently supplemented by the licensed output of Celler Maschinenfabrik, yet to be started this year.

Tulsa Oil Executives Hold Annual Christmas Party

Every week day morning of the year, a group of prominent Tulsa oil executives meet in the Mayo Hotel coffee shop, and when football, baseball, or fishing isn't under consideration, the oil business often is discussed. Each Christmas, this group has an annual party by some 50 prominent Tulsa oil executives. Pictured above are: Ed Sarlin, formerly an executive of Tide Water Oil Co.; Burch Mayo, host of the party and vice president and general manager of the Mayo Hotel Co.; and Barney Feagin, Feagin Oil & Gas Co.

Murray Rubber Names Mill To Mid-Continent Area

Frank L. Mill of Tulsa has been appointed representative in the Mid-Continent area for Murray Rubber Co., Houston, manufacturers of mechanical rubber goods for the oil industry.

Since his graduation from Rice Institute, Mill has devoted his time to the sale of oil-industry equipment. For the past 4 years he has worked in the Mid-Continent area of Oklahoma, Kansas, and parts of Texas and Missouri. Mill's office is in the Daniel Building, Tulsa.

Barnett Joins McEvoy As Sales Representative

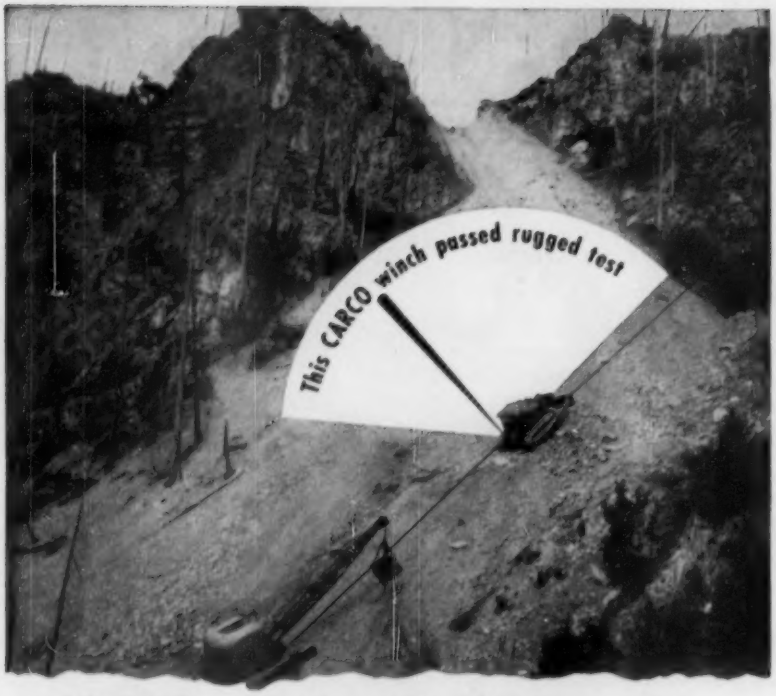
William D. Barnett has joined McEvoy Co. as sales representative with headquarters in Hobbs, N. M. He will be responsible for sales and service functions involving all McEvoy products in that area. Barnett is well known in West Texas and New Mexico, having been associated for 10 years with widely known oil-field supply lines.

Joy Acquires Assets of Baash-Ross Tool Co.

Joy Manufacturing Co., Pittsburgh, has acquired for cash, substantially all of the physical assets of Baash-Ross Tool Co., Los Angeles, producers of an extensive line of oil and gas-field equipment, it has been announced by J. D. A. Morrow, president of Joy.

According to Morrow, this acquisition is part of Joy's diversification and expansion program. It will enable the company to expand its activities substantially in the growing oil and gas-field market. Joy is planning to increase the sales and service of the Baash-Ross business, particularly in Canada and abroad where Joy is well established for sales and service in all the important foreign oil-producing fields.

Main plants of Baash-Ross are lo-



CARCO winches held fast when slippage meant disaster

... on tough Alberta to Vancouver pipeline job

Towing and holding heavy equipment on steep grades is a severe test of a winch brake. On the Model J Carco winch, the automatic, self-energizing brake will hold any load the winch can pull. It takes hold the instant tractor clutch is disengaged. Full braking power comes from high ratio leverage contracting the band on brake drum. Brake unit is reversible, permitting under- or over-wind free-wheeling. Brake release mechanism gives the operator complete load control at all times. The load can be checked at any point and even be "inched" down. Brake is enclosed, protecting it from the elements or external abuse.

Mr. G. T. Guest, Assistant to Project Manager of Comstock Midwestern, Limited, builders of "Big Inch-by-Inch", says, "The job needed Carco winches for towing and holding heavy machinery on steep grades and even for holding men by life lines. Had a single winch failed, men and machinery would have been lost. We found Carco winches equal to everything we asked of them."

On top of hill a Model J Carco winch is winching the Carco J winch and International TD24 shown above up steep slope at Coquihalla Canyon while it, in turn, is winching up clam digger.

You can expect greater value from the leading producer, and get it from Carco, first in winch production. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Wash. Branches at Portland, Ore., and Franklin Park, Ill.

WINCHES

FOR ALL INDUSTRIAL TRACTORS

cated at Los Angeles; Houston and Odessa, Tex.; Oklahoma City; and Canton, Ohio.

The newly acquired properties will be operated as Baash-Ross Tool Division of Joy Manufacturing Co. Glenn D. Johnson, presently executive vice president of Baash-Ross, will become a Joy vice president and general manager of the new division.

Dowell Promotes Sallee To District Engineer

W. L. SALLEE

Warren L. Sallee, Dowell Incorporated, has been promoted to district engineer of Dowell's New Orleans district, A. C. Polk, vice president and general manager has announced.

In 1949 Sallee joined Dowell as junior service engineer at Alice, Tex. He was promoted to service engineer in 1950 and has served at Snyder, Tex., and as area engineer at Hobbs, N. M. For the past 2 years he has been sales engineer at the company's general office in Tulsa.

Dowell's New Orleans district includes all of southern Louisiana, Mississippi, Alabama, and Tennessee, and parts of Georgia and Florida. Sales and services headquarters are located at Houma, Lafayette, Lake Charles, Buras, and Harvey, La., Hattiesburg and Yazoo City, Miss., and Anniston, Ala.

Conoflow Holds Sales-Engineering Conference

Conoflow Corp., manufacturer of pneumatic final control elements, recently held a sales-engineering conference for its representatives at the company's executive offices in Philadelphia.

Twenty-seven sales personnel from manufacturer's representatives attended the conference which was held under the direction of J. C. Koch, Conoflow's vice president in charge of marketing.

Included in the 3-day session were addresses outlining Conoflow's policies and principles by R. B. Werey, president, and M. M. Watkins, executive vice president and treasurer. Graphic-engineering talks and demonstrations by J. B. Madison, sales engineer, and E. K. Graham, Jr., manager of Conoflow's technical services department, covered the details of construction, operation, and application of company products. Projected sales and advertising programs were presented and general field-relation problems discussed under the guidance of J. C. Koch.

McCullough Tool Opens New Service Branch at Abilene

McCullough Tool Co. has opened a new service branch at Abilene, Tex., according to a recent announcement by O. J. McCullough, vice president. The new branch is fully staffed with experienced personnel completely trained in the use of all McCullough tools and services.

James Northcott has been placed in charge of the Abilene service location as branch manager. Northcott was transferred from McCullough's Cisco, Tex., branch where he had also served as branch manager. Among the other personnel at the new branch are Bobby Coy Lee, salesman; Richard Heine, operating engineer; John Hays, Jr., senior operator; and Elton Sanders, shop foreman.

The Abilene branch brings the total number of McCullough's offices to 51.

Web Wilson Names Hilliard As Division Sales Manager

B. HILLIARD

Ben Hilliard has joined the sales department of Web Wilson Oil Tools, Inc., as division sales manager headquartering in Los Angeles. He had been associated with Byron Jackson Co. for the past 20 years, during which time he served in the Mid-Continent, New York export, and California areas.

In making the announcement, B. M. Landis, vice president and general sales manager of Web Wilson Oil Tools, stated that Hilliard's appointment represents another important step in the firm's continued efforts to better sales and service. Together with Ray (Flash) Gorman, division sales manager at Dallas, Hilliard will assist field sales agents as well as supply-house jobbers, drilling-contractor and oil-operator customers.

Van der Horst to Expand Texas Plant

Dr. Hendrik van der Horst, president of Van der Horst Corp. has announced a $400,000 expansion program for the corporation's Texas plant, located in Terrell, Tex.

Van der Horst, specialists in heavy-industrial electroplating, has additional plants in Hilversum and Zwolle in the Netherlands, and Olean, N. Y. Spar-Tan Engineering Corp., Los Angeles, is the West Coast licensee for Van der Horst processes.

An increased demand in the South and Southwest for Van der Horst's patented iron and chromium-plating processes, Vanderly and Porus-Krome is credited by the corporation for necessitating the expansion. The two processes are used extensively for the reclamation of worn cylinders of internal combustion engines used in power, oil, and gas industries. In addition, seven manufacturers of engines for these varied industries incorporate Porus-Krome processed liners as standard equipment in engines of their manufacture.

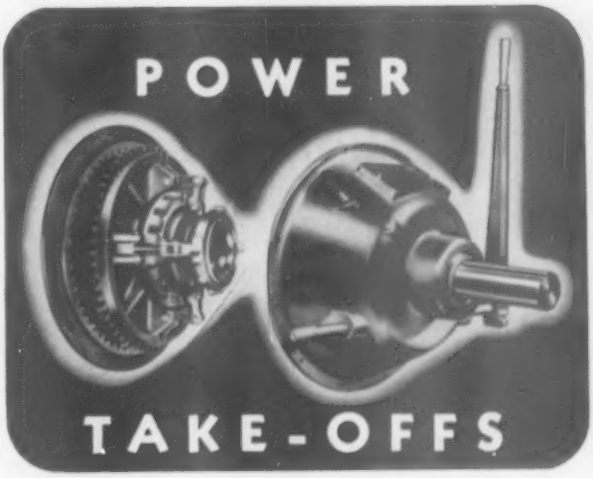
Sheffield Announces Two Promotions in Sales Staff

C. T. SMITH

J. R. McALPIN

Two promotions in the sales department of Sheffield Steel Division of

ROCKFORD



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CLUTCHES

Armco Steel Corp., in Houston, have been announced recently by Vice President W. S. Newell.

J. R. McAlpin, formerly Houston district manager has been advanced to assistant manager of sales in territory served by Sheffield's Houston plant. He was succeeded as Houston district manager by Cecil T. Smith, who was district representative.

McAlpin spent several years in the sales and metallurgical departments of various steel companies before joining Sheffield in 1949. During part of the Korean War, he was loaned to Washington by Sheffield for service in the iron and steel division of the National Production Authority.

Blaw-Knox to Offer New Hercules Reforming Method

Chemical Plants Division, Blaw-Knox Co., Pittsburgh, has been licensed to offer two related reforming processes developed by Hercules Powder Co.

The hydrogen and olefins processes both utilize alloy tubes set vertically in furnaces of similar design operating at high temperatures. For the production of hydrogen, natural gas or propane mixed with steam is passed through a catalyst in the tubes and reformed to a mixture of carbon monoxide and hydrogen. This mixture is processed through a shift converter to produce carbon dioxide and hydrogen. Recent improvements in this method make feasible the production of hydrogen from liquid petroleum fractions.

The olefins process, using similar apparatus in a thermal reaction, converts gaseous or liquid petroleum materials to a mixture of ethylene, propylene, and other products. A full scale pilot-plant installation has demonstrated the feasibility and extreme flexibility of the process. For example, in the conversion of East Texas crude, high yields of ethylene can be obtained in a single pass.

Le Roi Names Permar to Field Sales Manager

D. S. PERMAR

Don S. Permar has been named to the newly created post of field sales manager by Le Roi Division of Westinghouse Air Brake Co., Milwaukee. General sales manager Jack W. Heuser said that Permar will have over-all responsibility in managing the Le Roi field sales organization.

Le Roi Division is responsible for the marketing of Westinghouse industrial compressors, Le Roi portable compressors and the Tractair, in addition to front-end loaders, concrete mixers, and heavy-duty gasoline engines.

Permar was promoted from his position as sales manager of stationary air compressors. In 1945 he joined Westinghouse Air Brake as a pneumatic engineer. In 1946 he became a special representative for the Industrial Products Division.

Le Roi district sales offices are located in New York, Atlanta, Cleveland, Milwaukee, Tulsa, and San Francisco. Permar will provide administrative liaison between the factory and field sales staffs headquartering in those cities.

New Steel Fabricating Firm Organized in Tulsa

McKelvey Steel Corp., Tulsa, a new steel fabricating company, specialized in structural, pipe, and pressure-vessel fabrication, and also hard surfacing and reclamation of used flux. Officers of the new firm include L. N. McKelvey, president; Lenard Haughton, general manager; and L. N. (Bud) McKelvey, Jr., chief engineer.

McKelvey Steel began by purchasing an established plant in Tulsa. The plant, on a 3½-acre site, was partially con-

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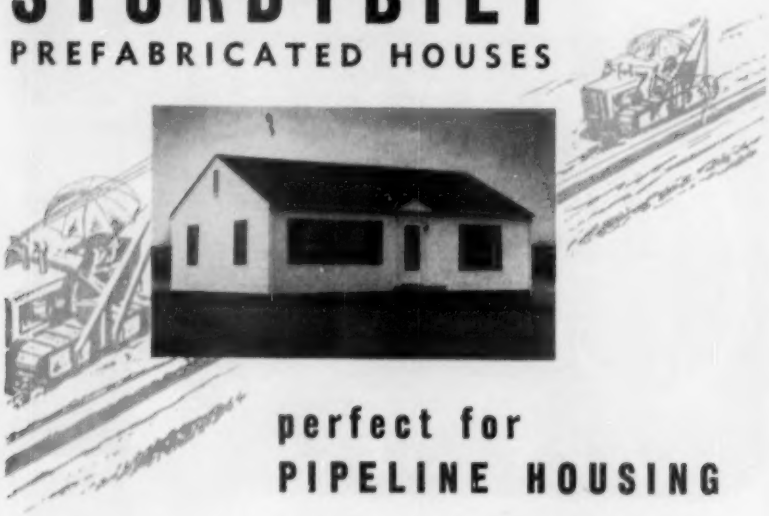

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OF SHOP TALKS

BY

JOURNAL EDITORS

Why Does The Journal Print So Many Personals?

Three pages every week we devote to "personals"—short items about individuals shifting jobs, getting promotions, receiving honors.

Why not devote the space to some good engineering or operating article?

Because *people* make the oil and gas industry. Big and technical though the industry is, it's people that make it tick. The personalities and abilities of the men moving into positions of leadership determine its present and future course.

There's another big reason, one peculiarly characteristic of petroleum. More than in any other industry, we have learned, oil men want to keep up with the doings of others. Oil is a fraternity, a way of life. Also, it is fluid and fast moving. Its men change jobs and locations frequently.

Because of this, oil men usually have friends in all branches of the industry, in many companies, in widely scattered locations. They meet each other all over the world-wide oil patch, and they like to keep up with each other's progress.

We don't print a man's promotion just to flatter him or to please his company. We print it because it's important and interesting news to our readers. Our readers tell us so. Many of them say that our personals pages are what they read first every week.

More than many industries, too, oil gives personal recognition to its men at all operating levels, gives them freedom to try new things, assists them to develop leadership. This process of advancement and development is reflected in our personals pages.

Oil would be a pretty cold and lifeless industry without this interest in the people on whom it depends. And the Journal would be equally cold and lifeless without its personals pages.

THE OIL AND GAS JOURNAL

structed in 1950. Now, under the direction of McKelvey Steel, the plant has doubled in capacity since May. Plans are underway to redouble its present capacity.

L. N. McKelvey commenced his career in the steel mills early. He started to work for Brier Hill Steel Co., which is now Youngstown Sheet & Tube Co. He began to work for Pioneer Tank & Boiler Co. in 1917 and was with Pioneer until the early part of 1927. At that time he started in with the newly incorporated Vulcan Steel Tank Corp. McKelvey was associated with Vulcan and Pioneer in both an ownership and management capacity.

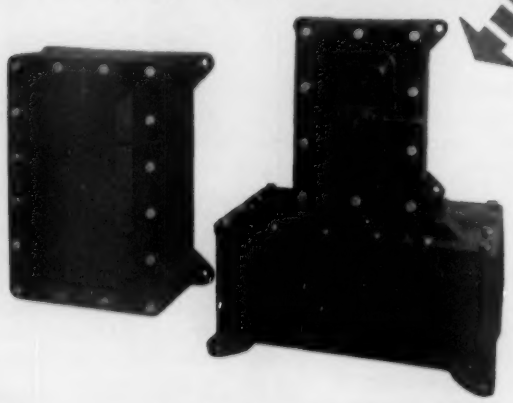
Haughton joined Smith Separator Co. in 1926 and moved to Parkersburg Rig & Reel Co. in 1939. He soon became assistant manager in charge of the Houston plate-fabricating plant. In 1950 he resigned from the company to take a position with Vulcan Steel Tank Corp., where he remained until his recent move to McKelvey Steel as general manager.

McKelvey, Jr., joined McKelvey Steel from Graver Tank & Manufacturing Co. where he was employed as product design engineer. Prior to his association with Graver, McKelvey was connected with Vulcan Steel Tank and Joseph A. Coy Co.

Explosion Proof

JUNCTION BOXES

for class 1, group D hazardous locations



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Oilwell Makes Sears, Dimick Representatives

Promotions of James R. Sears to field representative at Casper, Wyo., and Rodney V. Dimick to field representative at Medicine Lodge, Kans., both for U. S. Steel's Oil Well Supply Division have been announced by R. L. Armstrong, manager of Oilwell's Rocky Mountain area and Mark Barkhurst, Oilwell's Mid-Continent area manager respectively.

A veteran of 10 years' prior oil-field-production experience, Sears joined Oilwell in 1952 as storeman at Casper, the position he held at the time of his newest appointment.

Dimick joined Oilwell in 1941 at Ellinwood, Kans. Since 1950 he has served as field engineer at Great Bend, Kans.

Lane-Wells Opens New Truck Station at Okmulgee

To serve customers in Oklahoma better, Lane-Wells Co. has opened a new truck station at Okmulgee, Okla. James E. Clarke, formerly radioactivity operator in Seminole, Okla., has been made station superintendent at Okmulgee. This is the 10th branch in Oklahoma and the 102nd branch in the United States, Venezuela, and Canada.

Continental Makes McGreery Liberal Store Manager

Continental Supply Co. has named J. A. McGreery as manager of its store in Liberal, Kans. McGreery replaces W. A. Pratt who moved to McGreery's former position as field salesman at Liberal.

W. O. Morrow, former warehouseman at Harvey, La., has been named Continental store manager at Eunice, La.

Childs Is Sales Engineer For Coastal Engineering

The appointment of George C. Childs as sales engineer for Masoneilan & Smith Meter Division of Coastal Engineering Corp., New Orleans, has been announced by C. E. Naylor, president of the corporation.

Childs has been process engineer, project engineer, and staff and instrument engineer for Firestone Tire & Rubber Co.'s synthetic rubber plant at Lake Charles, La., for the past 6 years.

Childs' territory for Coastal Engineering will include all of southern Louisiana.

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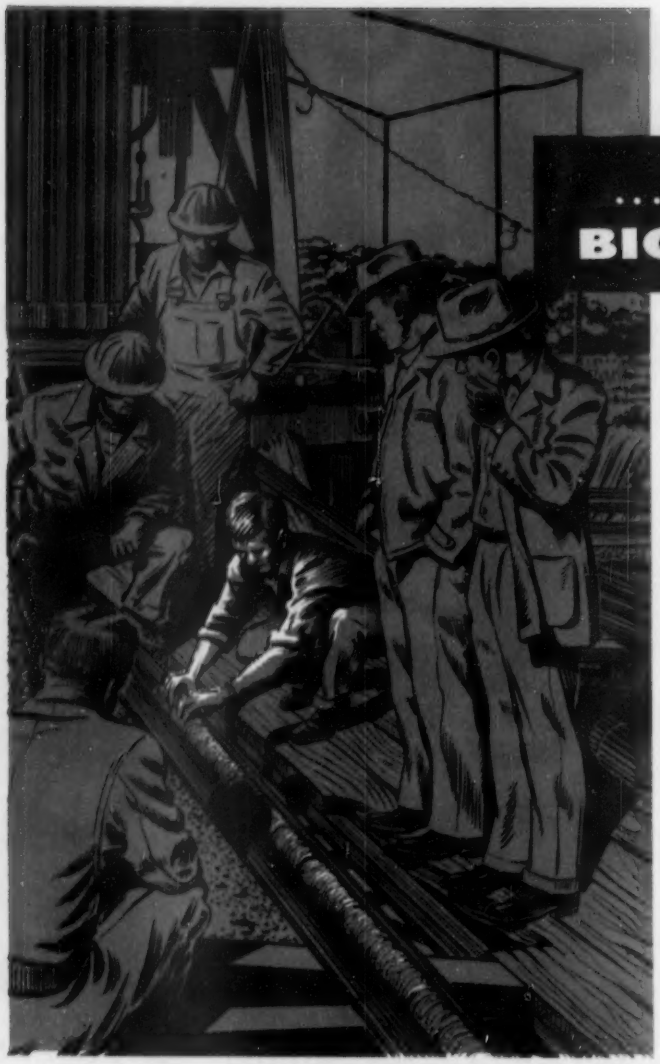

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EXPLORATION

The Paradox That Is Pembina

by Frank J. Gardner

PEMBINA is a paradox. It has been a blessing to its finders and a blighted hope to others. Its agonizingly slow development has been a frustration to its owners and a beneficence to other Canadian operators.

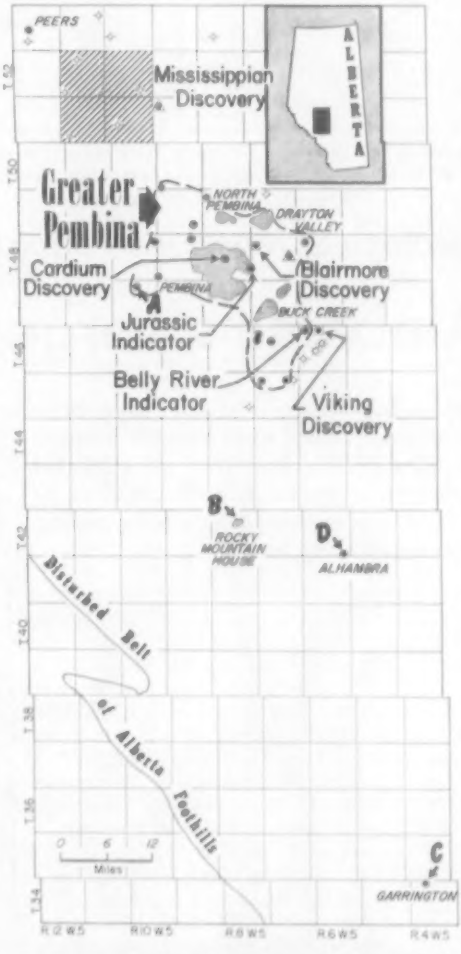
If Pembina had developed rapidly, it could have conceivably upset the entire market picture for Alberta crude and brought about cuts up to 15 per cent in the allowables of other Canadian fields. The fact that it has not grown fast is attributable only to nature and geography—not to any altruism on the part of field operators.

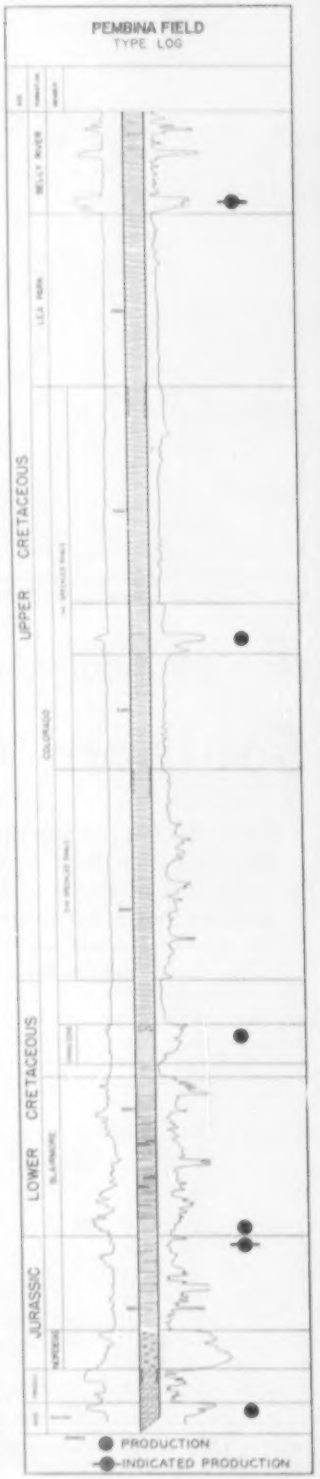
The wettest year in living memory has plagued Alberta and paralyzed Pembina, but with winter here, the picture will change. The frozen ground will once more make the area accessible; drilling will resume at a rapid pace, wells can be serviced again, holes left idle will be finally finished; gathering systems will be laid, and Pembina will grow. As the field expands, and oil flows through a new pipeline to Edmonton, the orderly disposal of Pembina crude is going to present a challenge to producers and to the Alberta Conservation Board.

A puzzle . . . As of now, nobody can say just what lies in store for westward growth of the big field; the northwestern and southeastern limits are also nebulous, but development to date, and events just past, indicate that the ultimate reserve and significance of the great strat trap will surpass anything heretofore anticipated.

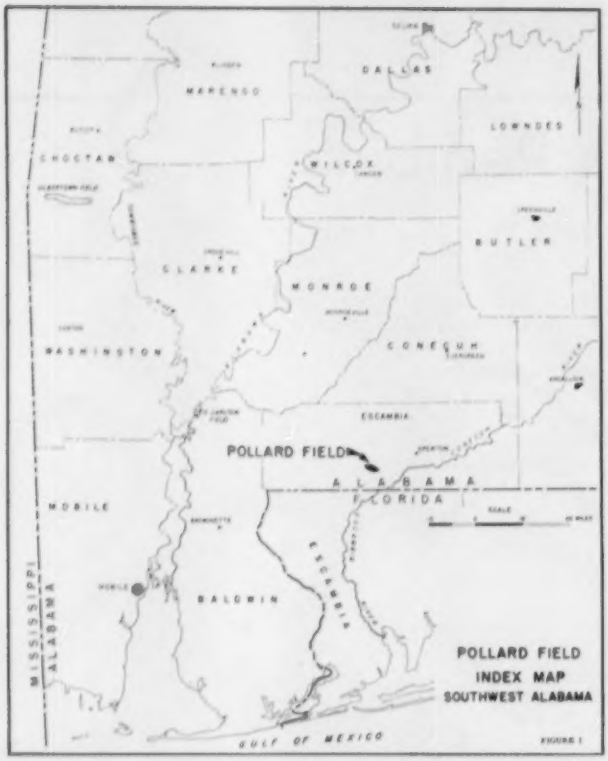
The map reveals developments to date—developments that have uncovered at least 400 sq. miles of proven oil acreage, 4,000 potential well sites, a government-recognized 3 billion barrels of oil in place (1 billion recoverable), four producing pays plus two potential pays, and wildcat strikes in every direction away from the proven field limits. Each well completed represents 200,000 bbl. of recoverable oil, and observers predict the completion of one well per month per active rig, with a minimum of 20 rigs turning.

And a problem . . . As stepouts extend the field limits 3 miles at a time, as happened last week at A on the map, the prospects are constantly enlarged. Developments to date indicate a great sheet sand, and nobody can say what will happen between the field proper and the outlying Cardium strikes at B, C, and D. There may be dry areas similar to the shaded Imperial block to the northwest, as re-entrants, embayments, deltas, and promontories in the eastern shoreline of the Cardium sea are defined. But Pembina crude will flow in consistently greater volume; **where** it flows will be the problem of every Canadian operator.

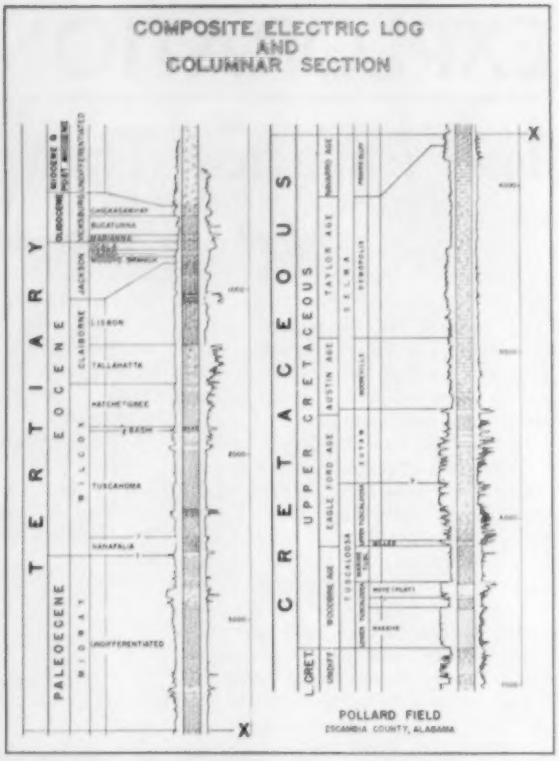




Continued expansion of Cardium production and discovery of six potential pays indicate that present estimates of reserves are conservative. Type log (right) reveals four proven pay horizons and two more in prospect. (Courtesy Trafford & Associates, Calgary.)



GEOPHYSICAL and subsurface work led to the discovery of Pollard field in 1952. Its production is controlled by faulting. Fig. 1.

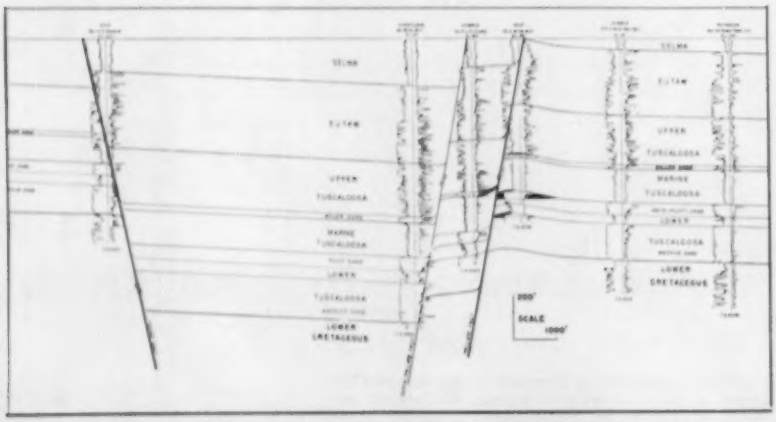


THE MAIN RESERVOIR for Pollard lies in marine sands of Tuscaloosa (Cretaceous) formation. Fig. 2.

Here's a detailed geological report on Pollard,

Southern Alabama's Largest Oil Field

More than a million and a half barrels of oil have been produced from Pollard's Cretaceous sands since Humble brought in the first producer in January 1952. Now, field development confirms that Pollard's production is related to and controlled by a major fault trend—a trend similar to those which form prolific oil fields in southern Arkansas and eastern Texas.



PRODUCTION at Pollard occurs on the south side of a graben. The well at extreme left helped define the graben structure. Fig. 3.

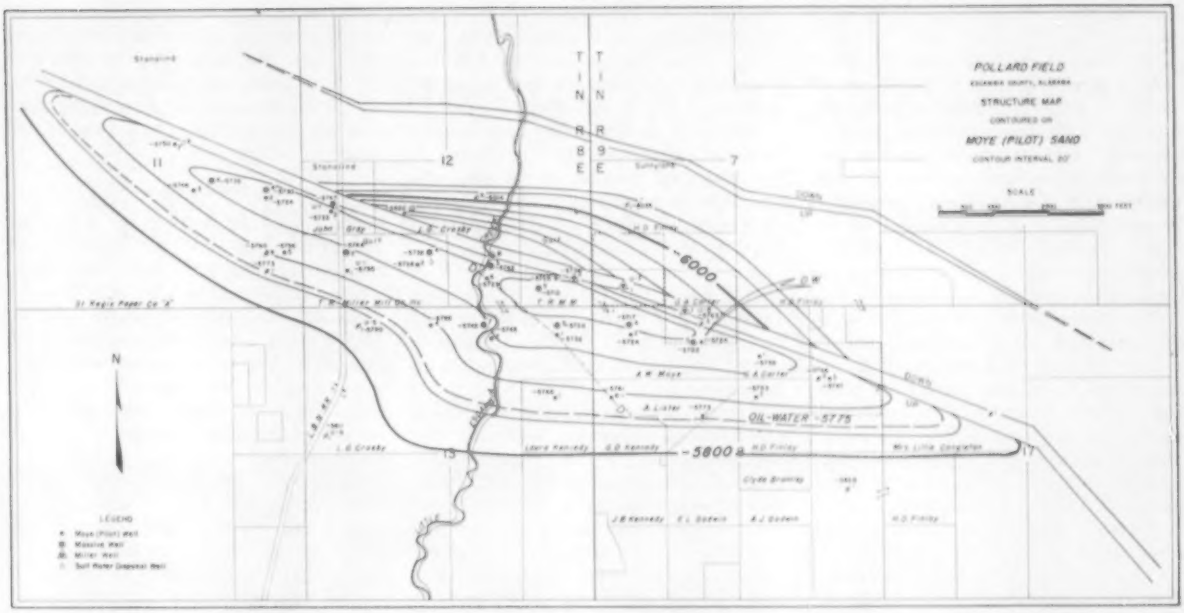
by C. Victor Winter

GRAVITY and magnetometer maxima recorded in 1942 attracted first interest to the Pollard area. Subsequent core drilling of this area disclosed an east-west-trending normal fault downthrown to the north. (Figs. 1 and 3.).

On the basis of this information, Stanolind Oil & Gas Co.'s 1 St. Regis Paper Co. A (F. A. Steward 1) was spudded on August 10, 1951. The Moye sand was tested for production, but the well was finally abandoned as noncommercial.

The show of oil in the Stanolind well greatly stimulated leasing in this area. In order to define the structure, a detailed core-drilling program followed that eventually led to the drilling of Humble Oil & Refining Co.'s 1 A. W. Moye, the discovery well at Pollard.

Author is with exploration department, Humble Oil & Refining Co., Tallahassee, Fla.
Paper originally presented before fourth annual convention of the Gulf Coast Association of Geological Societies, November 3-5, 1954.



CLOSURE against both the upthrown and downthrown sides of the Pollard fault controls production, as shown above. Fig. 4.

The well was completed in the Moye sand for 315 bbl. of 30°-gravity oil in January 1952.

Development by Gulf Refining Co. began on August 11, 1952, and resulted in a Moye sand completion on August 28, 1952. Stanolind's first productive well was completed on October 10, 1952, in the Moye sand. These operators, with Humble, continued development of the field at a rapid rate. Twin-well completions were made in the Moye and Massive sands on each 40-acre unit where both sands were productive, and triple completions were made where the Miller sand was productive.

Off-pattern spacing . . . During the course of development, hearings by the Alabama Oil & Gas Board to grant off-center locations necessary to obtain structural advantage, form drilling units, and establish field rules had an important role. A hearing held on February 20, 1953, after 28 oil wells had been completed, esablished the rules for Pollard field. The spacing rule stated that a well could be drilled as much as 300 ft. from the center of the unit rather than the statewide rule of 150 ft.

General stratigraphy . . . Drilling in Pollard field penetrated the south-southwestward-dipping Tertiary and Cretaceous sediments of the Gulf Coastal homocline of Alabama. A composite electric log (Fig. 2) shows 6,500 ft. of columnar section; the entire section, however, is not present in any one well in the field because of faulting.

Structure . . . The structure in the Pollard area is a west-northwestward-trending graben bounded on the north by the Foshee fault zone and on the south by the Pollard fault zones. This graben interrupts the normal 50-ft.-per-mile south-southwestward regional dip of the Gulf Coastal homocline and is approximately 2½ miles wide on Lower Tuscaloosa horizons (Fig. 3).

Faulting at Pollard field consists of the Pollard and the North Pollard faults, both of which are downthrown to the north (Fig. 3). The Pollard or main fault strikes N. 70° W. The throw increases from 50 ft. in the Ocala to about 300 ft. in the Lower Tuscaloosa, and the dip increases from 45° in the shallow beds to 50° at productive depths. Within 300 ft. of the fault, the Tuscaloosa beds show drag of 40 ft. or more. The North Pollard fault parallels the Pollard fault; on Selma horizons in central part of the field, the fault dips 47° with a throw of 300 ft.

Closure and drag of the Tuscaloosa beds both north and south of the Pollard fault give the Pollard structure the appearance of a faulted anticline (Fig. 3). The productive beds on the upthrown side, which have an average southward dip of 200 ft. per mile, form an assymetrical anticlinal nose in Section 13, T. 1 N., R. 8 E. The closure on the upthrown side is in excess of 130 ft. The productive beds on the downthrown side dip steeply to the north because of the tilted fault block between the Pollard and North Pollard faults and the added drag into the Pollard fault. The closure on the downthrown side is in excess of 150 ft.

Miller sand reservoir . . . This lenticular sand is at the base of the Upper Tuscaloosa on the downthrown side of the Pollard fault (Fig. 4). Oil has accumulated in closure and drag against the fault, and is believed by some geologists to have migrated through the fault zone from the Moye oil sand. This reservoir, which underlies 103 acres, is being drained by four pumping wells whose productive depths range from 5,624 to 5,722 ft. subsea.

The fine-grained Miller sand is interbedded with streaks of shale and dense sandstone which form a pinch-out in Section 12, T. 1 N., R. 8 E. West of the pinch-out, the structurally high porous sand is not oil-bearing. The thickness of the sand ranges from 15 to 30 ft., and the maximum net effective oil-sand thickness is 18 ft. with an approximate average of 13 ft. Average porosity of the sand is 32 per cent, and permeabilities average 600 millidarcys. Gravity ranges from 28.5° to 29.5° A.P.I., and the gas-oil ratio averages 78 cu. ft. per bbl.

Sufficient control is available to estimate the oil-water contact at 5,745 ft. subsea.

Moye (pilot) sand reservoir . . . This is the most prolific of the oil-bearing sands, and occurs at the top of the Lower Tuscaloosa on the upthrown side of the Pollard fault (Fig. 4). Closure against the fault and closure created by drag into the fault have formed the trap for oil accumulation. This reservoir which underlies 635 acres is being drained by seven flowing and thirteen pumping wells whose pro-

ductive depths range from 5,712-73 ft. subsea.

The fine-grained, glauconitic Moye sand is relatively clean in the upper 25 to 30 ft., but is argillaceous below this interval. This argillaceous material reduces the average porosity of the sand by about 5 per cent, reduces the permeability of the sand and its relative permeability to oil, and causes an erratic oil-water contact. This zone is probably productive where much of the argillaceous material is absent.

The Moye sand averages 91 ft. in thickness and has a maximum net effective oil-sand thickness of 40 ft., although 63 ft. of sand have been penetrated above the oil-water contact. Permeabilities are generally in excess of 500 millidarcys, but range from over 2,000 millidarcys to less than 50 millidarcys in the argillaceous zone.

Porosities range from 13 to 40 per cent, which average 29.5 per cent in the upper 25 to 30 ft. Gravities range from 25.6° A.P.I. in structurally low wells to 30.1° A.P.I. in high wells, and the gas-oil ratio averages 50 cu. ft. per bbl. The estimated original pressure at 5,750 ft. subsea was 2,649 psi. and in 21 months has decreased 134 psi. The bubble point has been established at 400 psi.

Water production ranges from 0 to 95 per cent. Wells completed below 5,750 ft. subsea produce water. From 5,750 ft. subsea to the oil-water contact at 5,775 ft. subsea, the percentage of water produced gradually increases.

Massive sand reservoir . . . This sand is separated from the Moye sand by a 60-ft.-thick shale interval, and is productive on the upthrown side of the Pollard fault. This reservoir, which underlies 291 acres, is being drained by 11 pumping wells whose productive depths range from 5,884 to 5,905 ft. subsea.

Oil present below the established 5,910-ft. subsea oil-water contact is not commercially productive as shown by Gulf's 4 T. R. Miller Mill which was initially completed below the oil-water contact and reworked 2 months later with the completion above the contact.

Salt-water production in March 1954 ranged from 84.6 to 97 per cent. If this percentage should increase, production from the Massive sand will be short-lived.

The Massive sand is about 240 ft. thick and has a maximum net effective oil-sand thickness of 23 ft. Average porosity is 28.5 per cent, and the average permeability is 495 millidarcys.

Drilling and Completion Methods

Shallowest production at Pollard is from 5,710-18 ft. in the Miller sand in Humble's 9 L. G. Crosby. Deepest production is from 6,111-17 ft. in the Massive sand in Humble's 5 A. W. Moye. The average time to drill and complete a well was 18 days at an approximate cost of $50,000.

Inasmuch as the casing and completion methods have varied according to the structural position of the well, the reservoir to be produced, and procedures of the three operators, no two wells were drilled and completed alike.

Except for an occasional twist-off in Selma chalk or Marine Tuscaloosa shales, or lost circulation in penetrating the fault zone in Upper Tuscaloosa sands, drilling difficulties were seldom encountered.

Coring of the productive sands was extensive in order to determine the variable nature of the sands and the amount of interval to be perforated. Testing was kept to a minimum and used only to evaluate a possible productive zone. In addition to the electrical log, various other surveys were made to aid in formation evaluation.

Detailed plotting of the fault in the subsurface permitted accurate Miller-sand well locations. These Miller-sand wells were planned to penetrate the sand at its highest structural position in the drag zone before the well crossed the fault. For example, Humble's 9 L. G. Crosby was located 295 ft. N. 34° E. of the center of the drilling unit, and cut the fault 15 ft. below the Miller sand.

Production

On April 1, 1954, a total of 1,465,760 bbl. of 25.6° to 30.1° A.P.I. gravity oil had been withdrawn from the reservoirs. The productive area of 738 acres contains 35 producing wells and in March 1954, a total of 2,616 bbl. of oil and 8,795 bbl. of salt water were produced daily. Salt-water production which increases daily at the expense of oil production is handled by three salt-water-disposal wells.

Initially, 29 of the presently producing wells flowed. But in March 1954, only 7 Moye (pilot) wells were capable of flow, and only 16 wells could produce the 100-bbl.-per-day allowable.

The absence of free gas, low gas-oil ratios, small decreases in bottom-hole pressures, and continued increase in water production show water drive to be the reservoir energy.

Exploration Highlights

MID-CONTINENT

OKLAHOMA

Oil Creek Proven At Centrahoma Pool Well

Oil Creek sand production has been proven at Stanolind Oil & Gas Co. 1 Crim, NW NW NE 34-2n-9e, Centrahoma pool, Coal County, southeastern Oklahoma.

The operator topped the Oil Creek at 6,928 ft. A drill-stem test was made at 6,924-33 ft. Gas reached the surface in 7 minutes at 200 M.c.f. per day. Oil flowed in 25 minutes, making 40 bbl. in 1 hour. Casing is being run.

Second Bromide Proven at Marshall County Pool Offset

A successful southwest extension to Sinclair Oil Co.'s 1 Griffin pool discovery well in Marshall County, southern Oklahoma, is indicated at Buffalo and Beard 1 Olmstead, NE SW NE 16-5s-5e.

On a drill-stem test in the second Bromide the gas flow gaged 5,420 M.c.f. per day. Recovery was 360 ft. of gas-cut mud and 1 pint of distillate.

A southwest extension to Marshall County's new oil pool north of Madill is indicated at Buffalo Oil Co. and Wayne Beard 1 Olmsted.

The 1 Griffin was recently completed flowing 810 bbl. of oil per 14 hours on ¾-in. choke from basal McLish perforations. The important new pool is located on the Madill-Aylesworth anticline.

New Gas Pool Opened In Garfield County

Garfield County in northern Oklahoma has a new gas pool. It was opened at M & M Drilling Co. 1 Bennett, NE NE SW 30-20n-3w.

The discovery well was completed for a flow of 2,000 M.c.f. of gas per day from perforations at 4,060-70 ft. in the Perry gas sand. The wildcat is

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located 3½ miles west of nearest gas production at Northeast Elk Horn field. It is situated southeast of East and Southeast Brown oil pools.

WEST TEXAS-NEW MEXICO

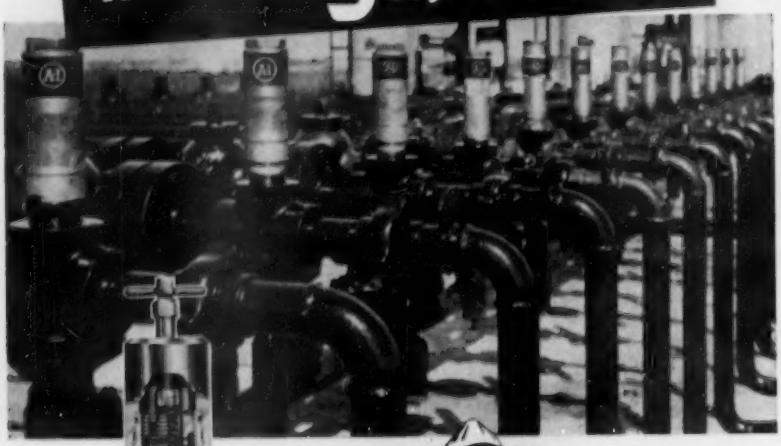
WEST TEXAS

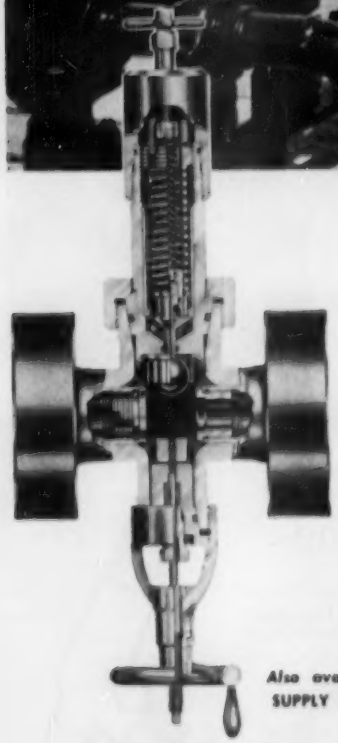
Big Flow Reported in New Ellenburger Area

Cities Service Oil Co. 1-C King, in the northern portion of Deep Rock-Ellenburger field, Andrews County, developed a flow of 140 bbl. an hour on drill-stem test. The test was run from 12,203-34 ft., using 1-in. top and bottom chokes. Time of oil to the surface was not reported due to the flow line plugging. The flow was turned into pits to clean, then into tanks where it gaged 279.8 bbl. of 45° oil in 2 hours. Gas-oil ratio was 305:1.

Tentative top on the Ellenburger, by samples, places it around minus 9,039 ft., which is approximately flat with Ralph Lowe's original discovery nearly 1 mile to the northeast in Section 5. It is also around 55 ft. low to the same operator's 1-B King, completed producer to the south which was the highest well in the field.

A-1 HI-LO Safomatic





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Gaines Well Indicated; New Start Made in Terry

A Devonian discovery was in prospect on the southeast edge of Russell-Clearfork field, and a new 12,500-ft. wildcat was located in southeast Terry County. Both wells are indicated on the accompanying map.

Gaines County Devonian prospect is Ashmun & Hilliard 1 Gillis, on southeast flank of Russell (Devonian and Clear Fork) field. Terry County deep test has been set by The Texas Co. as 1 Herring.

Ashmun & Hilliard 1 Gillis, Gaines County prospect, flowed oil, amount unestimated, on a drill-stem test between 10,935-11,000 ft. Bottom-hole flowing pressure was 3,875 psi. Operators drilled ahead to 11,075 ft. where completion was planned. Location in Section 422 is about midway between Devonian production in Russell field and Wolfcamp and Devonian oil in Alsabrook field.

In Terry County, The Texas Co. 1 A. H. Herring will be drilled in the NW NE 3-C38-PSL. Location is 2 miles northwest of Corrigan field, which produces oil from the Fusselman around 11,560 ft.

ARK-LA-TEX

EAST TEXAS

Woodbine Prospect in Northwest Henderson County

A Woodbine wildcat 2 miles northeast of Flag Lake field developed 2,040 ft. of clean oil on a drill-stem test and operators were confident of a commercial producer.

The new prospector is Mack Hays, Jr., and Iraq Drilling Co., Tyler, 1 F. E. Cooley, D. Muckleroy Survey, A-503. Tool was open 20 minutes on the section between 3,174-94 ft. Recovery was the clean oil plus 60 ft. of mud-cut oil, with no formation water. Bottom-hole flowing pressure was 700

psi., increasing to 1,175 psi. when shut in 20 minutes. Operators ran casing to bottom at 3,194 ft. and perforated for completion tests.

Dry Holes Limit Spread At South Malakoff

Wiggins Bros. and Fryer & Hanson Drilling Co. 1 Morrison, 1-mile east extension attempt at South Malakoff field, Henderson County, was reported dry at 7,644 ft., total depth. Location is in the Joseph Rice Survey.

On the south flank of the field, L. A. Grelling 1 McEntire estate, Jose Alpando Survey, missed the Bacon limestone pay in drilling to 7,590 ft.

GULF COAST

MISSISSIPPI

Second Producing Zone Established at Bolton

Magnolia Petroleum Co. has succeeded, after long testing, in making a small oil producer at its 1 Cockrum, north offset to Larco Drilling Co.'s discovery well of Bolton field, 12 miles west of Jackson, in western Hinds County.

Completed in Lower Cretaceous-Rodessa sand, the well establishes the field's second producing zone. Previous wells in the field have been completed in the shallower Paluxy sand, which was not commercially productive in Magnolia's well.

Completion is from casing-perforated intervals at 10,559-61 ft. and 10,569-73 ft. Potential gage was 59 bbl. of 39°-gravity oil per day, following through 5/32-in. choke with pressure of 125 psi.

The field has a new Paluxy producer a location west of Magnolia's Rodessa well. It is Larco Drilling Co. 1 Mashburn, completed with potential flow of 172 bbl. of 38°-gravity oil per day through 5/32-in. choke under pressure of 390 psi. Pay is perforated at 9,954-72 ft.

The field, discovered last July, now has five Paluxy wells and the one Rodessa producer.

SOUTHWEST TEXAS

Zapata County Wildcat Completed As Gas Well

Alaska Steamship Co., Texita Oil Co., and E. W. Gill, joint operators, have a new gas-discovery well in western Zapata County. It is 4 miles east of Old Zapata, on the Mexican border. Production, rated good for 2,850,000 cu. ft. daily, open flow, is from casing-perforated interval at 4,710-20 ft. Shut-in pressure is 1,763 psi. Gas is dry. Hole had been drilled to 5,041 ft.

Navarro Sand Produces In New Atascosa Strike

Another Navarro producing area has been uncovered in western Atascosa County. Discovery well, drilled by Rodney de Lange and associates at 1 Wilson, is in the James Barclay Survey, just southeast of Crown. Flow, on completion gage, was at the rate of 104.85 bbl. of 40.8°-gravity oil per day through ⅛-in. choke under pressure of 450 psi. Gas-oil ratio was 450 cu. ft. per barrel. Pay is perforated at 4,294-4,313 ft.

Location (arrow) of Rodney de Lange's new Navarro oil-discovery in western Atascosa County.

The discovery is several miles north of Pruitt field, and also the active Charlotte area, where a succession of Navarro discoveries has been made the past year along a trend extending westward into eastern Frio County.

Drilling is under way by the same operators at another location 5,500 ft. to the northwest of the discovery producer.

Big Chalk Oil Producer Completed at Pearsall

An unusually good Austin-chalk well for Pearsall field, southwest of Pearsall, in Frio County, has been completed by Andrews-Melon, Ltd., at its 1 Gilliam.

Completion gage was 401.39 bbl. of oil per day, flowing through 18/64-in. choke under pressure of 440 psi. with gas-oil ratio of 500 cu. ft. per barrel. Gravity of the oil is 34.6°. Pay is in open hole at 5,280-5,561 ft.

Location is on the east edge of the field about 2 miles north of the Melon area, opened last August by Drilling & Exploration, Inc.

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It is easy to see why more and more of these oil men are dealing with independent distributors—the men they know best and who know them and their problems on a close personal basis. They can count on getting what they want, when and where they want it.

• **The Big Change**—Back in the twenties when oil and gas producers were drilling less than 20,000 wells a year, you could count the independent distributors on the fingers of your hands. They were supplying oil men with only about 15 per cent of the equipment used.

The independents have grown fast since then. Today, with some 50,000 wells being drilled a year, there are about 30 large independent distributors from whom oil men are getting about 60 per cent of their equipment. The reasons for their growth are many.

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The owners and other top men for the independents are continually on the move visiting their customers' operations and keeping in touch with their activities and requirements. Their roots go deep in the oil fields.

• **Free Selection**—The independent distributor has an advantage in the range and variety of products he carries for the oil men. Because he is independent, he can select from nearly the entire field of manufacturers and deal with those firms he knows will provide the best in quality and service.

Today, with seamless tubular goods in easier supply, oil men who have become more cost-conscious are depending more on the local distributors because they know they are operating with less overhead. This means continued personal service at prices that are competitive.

• **How Quality Counts**—For nearly a half century, Pittsburgh Steel Company has been supplying the independents with most of the drill pipe, casing, and tubing produced at its Allenport, Pa., tube mills. Over these years it has established a reputation for giving them the kind of quality they depend on for reliable service to their customers.

Pittsburgh Steel has worked closely with these distributors, although it has no financial interest in any of them. It deals fairly and without favoritism, working out problems on the same personal basis that the independents work on with their customers. Pittsburgh Steel can also make decisions fast, yet it is large enough to supply a wide range of seamless tubular products in important volume.

Today Pittsburgh seamless is distributed through 19 independent suppliers who operate a total of 141 stores in every major oil field in the country and some abroad. If you are a drilling contractor, a producer, an engineer, or purchasing agent for an oil company—why not get the pipe of your choice through the supplier of your choice? Next time you order seamless pipe, *specify Pittsburgh!*

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SOUTH LOUISIANA

New Oil-Pay Discovery Extends Franklin Field

Productive area of Franklin field, in St. Mary Parish, is being extended approximately a half mile southwest by a new-pay discovery. The discovery is by Southern Natural Gas Co. in its 1 Godchaux, in 38-15s-9e, completing as an oil producer in sand at 12,836-54 ft. Completion gage was 227 bbl. of 31.4°-gravity oil per day through 10/64-in. choke with pressure of 1,195 psi. and gas-oil ratio of 1,195 cu. ft. per barrel.

The field, opened in September 1953, now has six wells, two completed with gas-condensate production in an 11,080-ft. sand, and four with oil production in as many different sands, ranging in depth from 11,900 ft. to 12,900 ft.

Development Spreads In East Lake Palourde Field

East Lake Palourde field, in Assumption Parish, has a new extension producer. It is Union Oil Co.'s 1-A Norman, ¾ mile southwest of the nearest well. Testing the field's 13,380-ft. oil sand, perforated at 13,388-98 ft., it flowed at a daily rate of 300 bbl. of 39.4°-gravity oil through ⅛-in. choke. Pressure was 2,900 psi., and gas-oil ratio 1,250 cu. ft. per barrel.

Inside productive area, California Co. is completing a gas-condensate well at its 2 Lutcher-Moore, which, perforated at 13,148-90 ft., flowed 96 bbl. of 47.2°-gravity condensate per day with gas-liquid ratio of 31,250 cu. ft. per barrel.

Humble Oil & Refining Co. still is testing its 1 Norman-Breaux, outpost test 4,000 ft. west of field production. A drill-stem test of perforations at 13,100-06 ft. got a flow estimated good for 3,125,000 cu. ft. of gas and 33 bbl. of condensate per day. Test was through 3/16-in. and ⅛-in. chokes. A previous test at 13,188-95 ft. got salt water. Other prospective pay zones are to be tested before completing the well.

The field was discovered last April by Union Oil Co. Five oil and three gas-condensate wells have been completed.

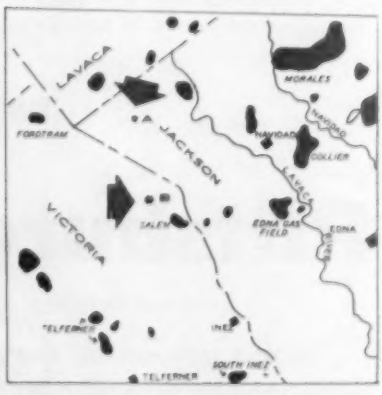
Shallower Oil Production Opened in New Gulf Field

Shell Oil Co. is opening another oil-productive sand in its new Eugene Island Block 18 field, in the Gulf of Mexico 4 miles off St. Mary Parish. Its 1 State lease 1665, northwest of the discovery well, made 220 bbl. of 35.1°-gravity oil with 355,000 cu. ft. of gas per day, flowing through 10/64-in. choke under pressure of 1,550 psi. Pay interval is 9,075-78 ft., approximately 300 ft. shallower than that of the company's discovery well, completed last June. Location is in Block 13, adjoining Bloc 18 to the north.

TEXAS GULF COAST

Two Frio Fields Opened Only Four Miles Apart

Two new Frio-sand fields, located only 4 miles apart, are being opened in northwestern Jackson County and northeastern Victoria County.



Portion of northeastern Jackson and northwestern Victoria counties showing locations of Sun Oil Co. and Kirkwood & Co. discoveries (A and B, respectively).

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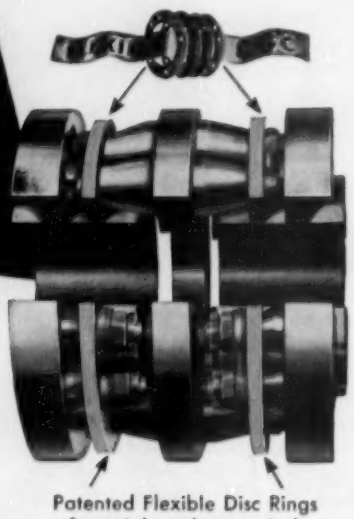

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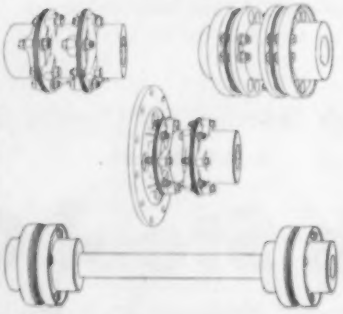

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The northwestern Jackson County discovery, productive of oil, is by Sun Oil Co. Discovery well, 1 McDaniel, in the Elisah Burton Survey, 15 miles northwest of Edna, flowed 39.9 bbl. of oil per day through ⅛-in. choke from sand interval at 5,868-80 ft. It had pressure of 1,750 psi. and gas-oil ratio of 9,173 ft.

The concurrent discovery to the south, across the line in northwestern Victoria County, is by Kirkwood & Co. at its 1 Musselman, completed as a prolific dry gasser, calculated good for 110,000,000 cu. ft. per day, open flow. Pressure through ⅛-in. choke gaged 1,318 psi. Completion is in sand interval at 3,206-10 ft.

Location, in IRR Survey 56, is 12 miles west-northwest of Edna, and 7 miles north of Inez. It is northwest of the one-well North Inez field, and also Salem field. The same operators are drilling another test about 1 mile to the east with location just west of North Inez field.

Offset Well Confirms Shallow Gas Discovery

The recent shallow gas discovery by Haroldson L. Hunt, Jr., trust estate, and Kirkwood & Co. 4 miles southwest of Taft, in San Patricio County, is being confirmed by Sun Oil Co.'s east offset and the new area's second well.

Sun's well, 1-A McCann, is rated good for 13,250,000 cu. ft. of gas per day on open flow. Shut-in pressure is 1,050 psi. Pay is perforated at 2,617-26 ft. The discovery well, completed last August, is perforated at 2,632-38 ft. It had open-flow potential of 20,500,000 cu. ft. per day.

The area, designated as Mayo field, is 2 miles south of South Taft field, and about the same distance north of East White Point field.

EASTERN INTERIOR

ILLINOIS

In White County, 7 miles east of Carmi, Clark & Clark have completed 1 Henning, NE NW NW 19-5s-14w from the Aux Vases sand at 2,941-72 ft. The well is flowing 550 bbl. of oil per day after fracturing. This wildcat is a ½-mile stepout.

● In Marion County Union Contracting & Engineering Co. are completing 1 Hawkins, SE SW SW 29-1n-4e, 10 miles southeast of Salem.

A 2-hour drill-stem test in the St. Louis lime at 2,881-2,919 ft. recovered 180 ft. of free oil and 60 ft. of mud-cut oil. This wildcat is 2 miles away from other production.

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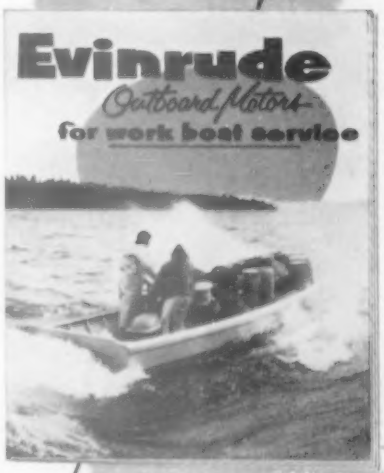

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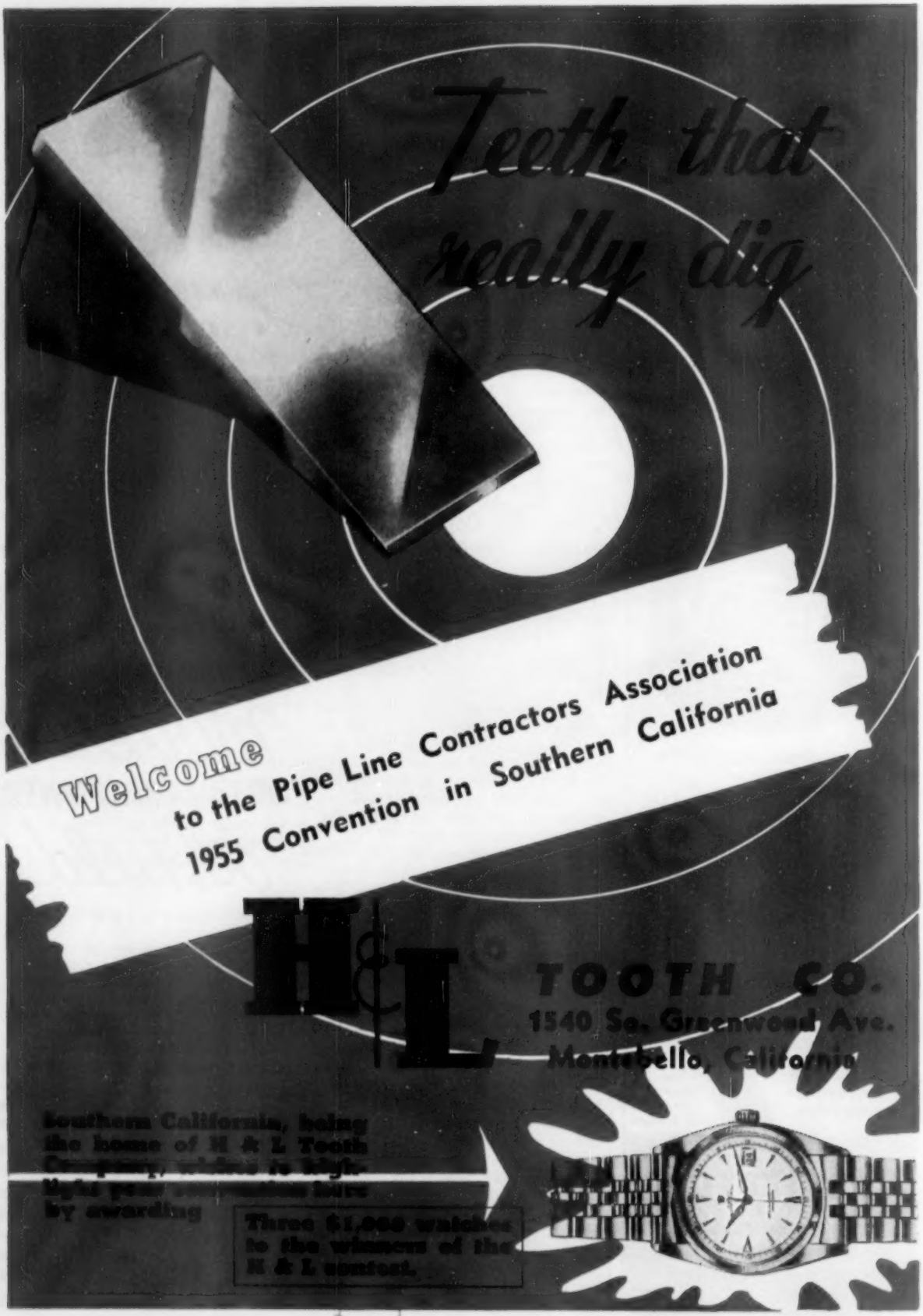
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● In Bond County Larsen 1 Stoneburner, NW NE 3-6n-2w, was finaled for 137 bbl. of oil per day on the pump, natural. Production is from the Dutch Creek sand at two intervals, 2,257-67 and 2,273-75 ft. This wildcat is 10 miles west of Vandalia and is a ½-mile outpost to Woburn pool to the south.

INDIANA

Spencer County Wildcat Starts New Oil Play

Slagter Producing Co. has set casing to test the Jackson sand at 1,324-35 ft.

A new play is developing 1½ miles from other production, 7 miles west of Rockport, Ind.

at 1 Clyde Jones, SE NE SW 34-7s-7w, Spencer County wildcat.

A 2-hour drill-stem test recovered 25 ft. of free oil, 25 ft. of oil-cut mud. The wildcat, 1½ miles from production in a little-drilled area, should begin a drilling play if successful.

GREAT LAKES

MICHIGAN

Reed City Pool Records Best Richfield Well Yet

Pure Oil Co. had the best Richfield oil producer completed to date under test in the Reed City pool at its 1-A Jewett, NW NW SE 31-18n-10w, Lincoln Township, Osceola County. This older Reed City zone well which was deepened to the Richfield, was under test natural at 4,618 ft., new total depth. Well flowed as much as 140 bbl. of oil natural in 6 hours at this point. Tubing was being run in preparation for a sandfrac treatment.

The E. Edwin Brehm 1 Jeppesen, NW SE NE 3-11n-7w, Douglas Township wildcat, Montcalm County, was rated good for from 15 to 25 bbl. of oil a day from Traverse pay after a 1,000-gal. acidization. This newest Michigan Traverse oil discovery well may be reacidized. Alpena Traverse top was logged at 2,995 ft. Pay showed at 3,025-34 ft. Well was reported to be flowing its production. Although no new starts had been officially announced for follow-up tests here, it was reported that one or more offset locations were being considered for early drilling in 1955.

● First follow-up test for the extended Ravenna Traverse oil pool, Muskegon County, was announced by R. W. Devine & J. W. Lang Co. for the SE NW NE 28-9n-14w, the west 10-acre offset to the new half-mile extension producer, R. W. Smith & Devine & Lang Co. 1 Sklepinski, SW NE NE 28-9n-14w, which was rated good for 6 bbl. of oil an hour, restricted flow, from Traverse pay at 1,863 ft., total depth. Top of Traverse lime was logged at 1,862 ft. Well drilled itself in and appeared to be the best completion scored to date in the Ravenna pool.

EASTERN CANADA

Ontario . . . In the old Oil Springs shallow field, Lambton County, water pressure has been turned on in the first unit of the secondary recovery program being carried out by Nye De Mers and associates.

Five grouped wells, drilled in the Kelsey Road area, were previously shot with nitro, following which natural gas was injected to build up formation pressure. Water forced under high pressure into four outlying wells is expected to force oil from a central hole. Some weeks will be required to test the operation.

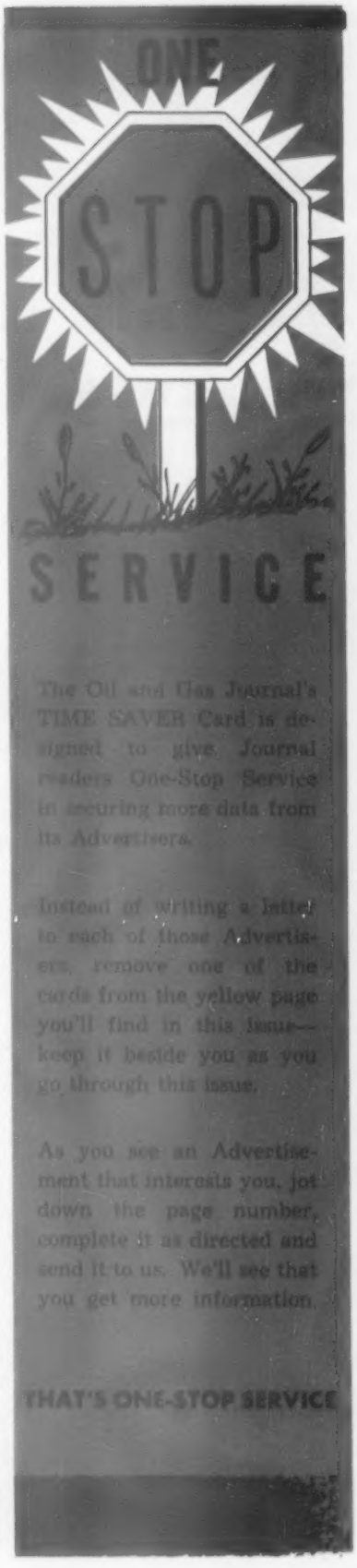
On the Thomas Clubb farm, Lot 33, Concession 1, Dawn Township, Lambton County, has completed a large gasser in the Dawn sand. A well on the James Walker farm is nearing completion. Locations are in Pool 156, which includes a well on the Norman Wilson farm with 50,000,000 cu. ft. open flow.

APPALACHIAN

OHIO

An extension of ¼ mile to Nashport pool was completed by the Oxford Oil Co. on 4 N. O. Crown, Lot 3, Licking Township, Muskingum County. Clinton at 3,095-3,129 ft. made 5 bbl. natural and 212 bbl. with 1,150,000 cu. ft. of gas in a 24-hour test after fracturing.

● Mid East 2 S. M. Moore, Section 8, Pike Township, Coshocton County, a second well in one of the several pools south of West Carlisle, made 80 bbl.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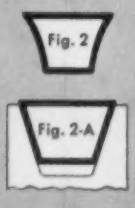

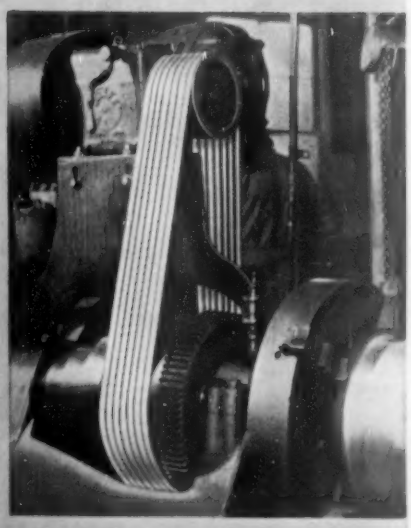

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and 150,000 cu. ft. gas after fracturing sand, found at 3,301-3,354 ft.

● Mathews Oil Co. 1 F. C. Blazer, Fr. 33, Lodi Township, Athens County, intended for the second Berea, picked up 750,000 cu. ft. natural in the Maxburg at 810-15 ft.

EASTERN KENTUCKY

In Big Sandy gas field and located in the Martin County sector on Rockhouse Creek, Kentucky West Virginia Gas Co. have completed 6241 Carlisle Lands as a Mississippian Maxon sand gas well. Producing sand was topped at 1,198 ft. and penetrated to a total depth of 1,206 ft. Well recorded a rock pressure of 372 pounds in 38 hours. Well was brought in natural.

PENNSYLVANIA

Parker Township, Butler County, Southwest Pennsylvania, Walker et al 1 John Walker, reached a depth of 7,280 ft., and are now trying to fish two strings of tools lost in the hole. In Gaskill Township, Jefferson County, Fairman Drilling Co. 1 Clair Reed, is under-reaming at 7,120 ft. to run casing.

WEST VIRGINIA

In Blue Sulphur district, Greenbrier County, West Virginia, Columbian Carbon Co. 1193 W. E. Hedrick, wildcat, elevation 2,349 ft., recorded the chert at 6,897 ft. and will diamond core drill. The depth of the hole is 6,912 ft. In Walker district, Wood County, Hope Natural Gas Co. 9634 Power Oil Co., deep test is now drilling at 11,866 ft.

PACIFIC COAST

CALIFORNIA

Beehive Bend Outpost

R. S. Rheem, Operator, was preparing to drill 2-63 Zumwalt as a north extension test to the 5,900-ft. upper Cretaceous pool opened last September by 1-63 Zumwalt in 2-19n-2w. In the eastern portion of the expanding field, which may become the second most important dry gas field in Sacramento Valley, General Petroleum Corp. completed 1 Whyler-Capital Unit at 5,725-50 ft. as a 2,300-M.c.f. producer. Location was in NW 24-19n-2w.

Exeter Pool Outlined

Productive limits of the Miocene sand pool discovered last summer at Midway-Sunset, Kern County, by Exeter Oil Co. may have been defined along the northern flank. Exeter 13-J Murphy Fee, a north offset to the SW SW 28-32s-24e discovery, was plugged back for redrilling after testing wet at 5,363-5,430 ft. A northwest offset, Standard Oil Co. of California 386 29D, was in process of completion with perforations set at 5,264-98 ft.

Oxnard Test Bottomed

Standard Oil Co. of California was plugging back its wildcat 1 mile west of the Oxnard field, Ventura County, after drilling to 12,070 ft. The outpost, 101 Maulhardt Community in 1-1n-22w, was one of three searching for the new 9,000 and 10,000-ft. pays. In 8-1n-21w, The Texas Co. 1 Capital-Silva was drilling below 7,500 ft. In Section 5-1n-21w, also a south flank location, Lann-Tex Oil Co. 1-5 Capco was being deepened from the plugged back depth of 4,282 ft.

For Tejon-Grapevine

Reserve Oil & Gas Co. was under way with a northeast offset to the new Transition (Pliocene-Miocene) pool its 41A-34 Reserve-Pauley discovered at Tejon-Grapevine, southeast San Joaquin Valley. Drilled as a test to evaluate oil showings encountered at about

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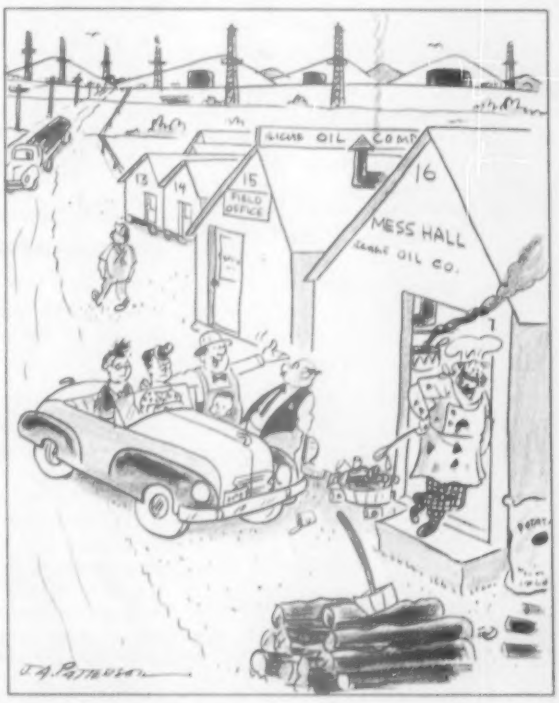


THE OIL AND GAS JOURNAL

"No, sir, no one can cook like my little Molly—but old Sloppy Joe there comes pretty close to it."

2,750 ft. in wells having the 5,600-ft. Olcese sand as their objective, 41A-34 cored the new sand from 2,735 to 2,805 ft., total depth.

It was completed flowing 169 bbl. of 18.6°-gravity crude through a 20/64-in. choke. Nearest Transition zone production in the older portion of the field is about ½ mile south. About 1 mile west of the 41A-34 discovery, Drilling & Production Co. recently established Jewett sand oil production at a depth of 7,000 ft. in its 33-33 J.V.

WESTERN CANADA

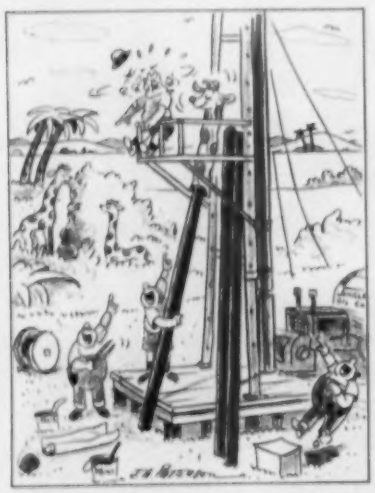
ALBERTA

Province Recorded Three Discoveries During Week

Alberta accounted for all three discoveries recorded in western Canada during the past week, two in the south and one in the northwest part of the province.

The most encouraging of those was recorded by Socony-Vacuum Oil Co. of Canada, in the Makepeace area. That well discovered oil in the Madison section of the Mississippian. The other two, both finding gas, were in the Giroux Lake and Standard areas. The first is being drilled by Stanolind Oil & Gas Co., while the latter test is a Raymond I. Smith, American oil operator, venture.

Makepeace . . . This test, Socony-CPR 27-10 Makepeace, LSD 10, 27-23-19w4, lies 4½ miles east of a Socony dry hole at Granta. It is 8½ miles northwest of another Granta area wildcat that found some oil in the Blairmore and Madison. The well entered the Madison at about 4,490 ft. Gas flowed at the maximum rate of 1,230 M.c.f. per day on test.



"Hey, fellows, look over here—there's some more giraffes . . ."

Giroux Lake . . . One of the gas strikes, Stanlind 1 Giroux Lake, LSD 6, 20-65-20w5, is 14 miles southeast of Little Smoky area production. This wildcat tested gas in the Cardium sand.

Standard area . . . The other strike found a moderate flow of gas from the Blairmore. This wildcat is 50 miles east of Calgary. It is Smith-Socony-CPR 1 Standard, LSD 3, 28-25-21w4.

ROCKY MOUNTAIN

COLORADO

Logan County Strat Test Is Apparent Gas Strike

Shell Oil Co. recovered gas at the rate of 4,640,000 cu. ft. per day at A-1 State 694, C NW SE 12-6n-53w, Logan County. Test was in "D" sand at 4,511-44 ft. Tool was open 1 hour, and flowing pressure was 740-880 psi. The operator recovered 16 ft. of oil and 200 ft. of slightly oil and gas-cut muddy water in pipe. Shell is drilling below 4,600 ft., with top of "J" sand reported at 4,597 ft. The well is one of a series of slim holes drilled through the Denver Julesburg basin by Shell. Five previous Shell tests in this township were failures. The apparent discovery is 2 miles southwest of Dune Ridge field, south of the South Platte River.

Weld Wildcat Finds Oil in Unidentified Pay

Nebraska Drillers, Inc. recovered 4,000 ft. of oil and 1,000 ft. of heavily oil and gas-cut mud on test of 1 Nay, C NW SE 14-9n-58w, Weld County. The recovery has not been confirmed by the operator. No official statement has been made other than that some oil was recovered on drill-stem test. The unofficial report indicated that the interval 5,430-72 ft. was tested. The well found gas at about this depth some time ago, and caught fire. It was shut down for several days for rig repair. Based on previous drilling through the immediate area, the test was in or near Niobrara, previously not productive in the Denver-Julesburg basin.

Nebraska Drillers is now reported running drill-stem test in "J" sand, after unconfirmed reports indicating shows in that formation. The well is a tight hole.

Jackson County Confirmation Waiting On Orders

Lion Oil Co. has reached total depth of 5,265 ft. and contractor is waiting on orders at 1 Hackleman, C NW NW 23-10n-79w, in the Battleship area, Jackson County. The well is an attempted confirmation to Lion's 1954 discovery of both Dakota and Lakota production in the field. The operator reported no shows in the current well. The discovery made commercial quantities of oil on test of both Dakota and Lakota sands, but was completed only in the form zone. A faulted Dakota zone was found at 5,092 ft. in the present well.

Casing Set At Apparent Discovery in Logan County

Creslenn Oil Co. has run pipe at 1 Ramey, C SE SE 17-10n-53w, Logan County. Casing was landed after retest of "D" sand. The operator reported recovery of 1,454 ft. of oil and 534 ft. of water from the interval 4,874½-79 ft. with tool open 1¼ hours. A flow of gas at the rate of 106,000 cu. ft. per day was logged on the test. A previous test of the "D" sand zone 4,883½-91 ft. recovered 450 ft. of oil with 1,890 ft. of water. The operator cored 3 ft. of "J" sand with shows, but recovered only water on drill-stem test. The wildcat is 3 miles southeast of Little Hoot gas production.

NEBRASKA

Cheyenne County Discovery Tested

Ryan-Davis Oil Co. and Cimarron Western Drilling Co. recovered 1,475 ft. of oil, 260 ft. of oil and gas-cut mud and 60 ft. of fresh, muddy water on test at 1 Graham, SW SW SW 20-16n-51w, Cheyenne County. Test was in "J" sand, and of the zone 5,215-28 ft. Tool was open 1 hour. The operator has set pipe and is waiting on cement. The well is 12 miles west of the town of Gurley, and north of principal Cheyenne County production. It is northeast of a recent indicated discovery by Pray and Nelson in 31-16n-51w, which is the only other pool indicated in the immediate area.

UTAH

Shell Stakes New Southeast Utah Wildcat

Shell Oil Co. has made location for a wildcat 3 miles north of the old Boundary Butte field in San Juan

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County. The well is 1 North Boundary Butte, C SW NE 33-42s-22e. Objective is not reported, but in view of Shell's recent previous work in this general area, will probably be at least Pennsylvanian. The new location is 10 miles southwest of Shell's Desert Creek discovery, completed in 1954 to give the Paradox basin its first commercial production. Shell also added Arizona to the list of the nation's producing states in 1954 with completion of a small producer in Apache County, east of the old Boundary Butte field.

WYOMING

New Tensleep Producing Area Opened At Sussex

Continental Oil Co. has logged 240 ft. of saturated Tensleep sand in a well west of previous Tensleep production in Sussex field, Johnson County. Continental recovered 7,600 ft. of oil on drill-stem test 8,985-9,037 ft. at 106 Unit, SW SE SW 15-42n-78w. The operator reported the oil-water contact in this well at variance with that in other Tensleep producers to the east, indicating the possibility of an intervening fault and a new area of Tensleep production. Sussex field was discovered in 1948, with production originally from Lakota. Several shallower formations were later added, and Tensleep discovery was made in May, 1951.

Goshen County Show Reported, Not Confirmed

F. R. Anderson is drilling below 6,825 ft. at 24-D-33, SE SE SW 33-24n-61w Goshen County, after unofficial reports credited the well with recovery of 25 ft. of saturated "D" sand. Anderson confirmed only that the formation was tested with "Unsatisfactory" results. The well is 40 miles northwest of production in the northwestern corner of the Denver-Julesburg basin. It will test "J" sand below present depth.

Second Beaver Creek Madison Producer Completed

Stanolind Oil & Gas Co. has reported a flow of 363 bbl. of oil per day at completion of 32-M, NE SE SE 10-33n-96w, in the Beaver Creek field, Fremont County. The well topped Madison at 11,134 ft. and went to total depth of 13,471 ft. It is ½ mile south of the Madison new pay discovery completed in this field in 1953 for a flow of 341 bbl. per day. Both wells were gaged on small choke.

South Torchlight Phosphoria Production Tested

Pond Petroleum Co. and Forest Oil Co. swabbed 37 bbl. of oil in 4 hours on test of Phosphoria at 1 Pond-Government, SE SW NE 30-51n-92w, in the South Torchlight area of Big Horn County. The well was drilled in 1952 to a total depth of 3,391 ft. Operators recently set pipe at acidized Phosphoria. This formation has not previously produced in the immediate area. Operators are continuing tests.

MONTANA

Show Reported At Daniels County Wildcat

Richfield Oil Co. recovered 25 ft. of Mission Canyon lime with a show of oil at 1 Madoc, C NW SW 31-37n-49e in the Whitetail area of Daniels County. Drill-stem test of the zone recovered only 30 ft. of water with no show, however. The test was run at 7,118-48 ft. Richfield is drilling below 7,148 ft. The well is the first test of the Whitetail structure.

East Little Beaver Confirmation Testing

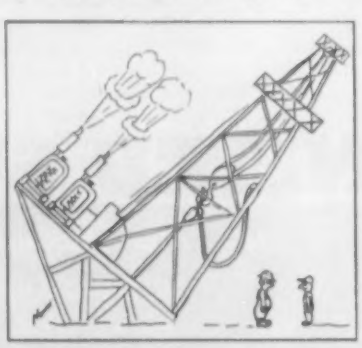
Shell Oil Co. recovered 240 bbl. of fluid per day on swab from 32-X-6, NW NW NE 6-4n-62e, confirmation at the East Little Beaver discovery, Fallon County. Net oil recovery was 156 bbl. The well is a south offset to the recent discovery, which was completed for a pump gage of 209 bbl. of oil and 1 of water per day. Production is from Red River.

Successful Wildcats

SOUTHWEST TEXAS

Brooks County: Mills Bennett estate 13 Fee, Palo Blanco Sur., A-258. IP 99.57 BOPD, X-29 choke, 42°, perforations 3,992-4,000 ft. TD 6,085 ft. (New pay in Mills Bennett field.)

Dimmit County: Sutton Drilling Co. 1 Cleveland, A. Utz Sur., A-1040 (2 miles west of Cabeza Springs). IP 76 BOPD, 5/32-in. 44°, Olmos 3 sand 2,536-41 ft. (perforations). TD 2,541 ft. (New pay in Wintergarden field.)



"Yeah! This is my first directional hole; why did you ask?"

TEXAS GULF COAST

Hardin County: American Republics Corp. and Houston Oil Co. 1 Nelson fee, J. A. Vickers Sur., A-52. IP 121.76 BOPD, 9/64-in., 41.1°, Yegua 6,897-6,900 ft. (perforations). TD 6,005 ft. (New pay in Silsbee North field.)

San Patricio County: The Texas Co. 1 Welder, J. de la Garza Sur., A-8. IP 4,650 M.c.f. daily, ¼-in., dry gas, Frio 7,616-28 ft. TD 8,748 ft. (New pay in Odem field.)

TEXAS PANHANDLE

Hansford County: R. H. Fulton 2 Matthews, 104-45-H&TC. IP 16,090 cu. ft. gas, pay 6,947-57 ft. RP 1,885 psi. TD 7,475 ft.

Humble Oil & Refining Co. 1 Oil Development Co., 2-4T-T&NO Survey. IP 1,500,000 cu. ft. gas, Mississippian 7,650-76 ft. TD 9,650 ft. First Mississippian pay in Panhandle.

WEST CENTRAL TEXAS

Jones County: Drill Well Oil Co. et al 1 Herring, Sec. 23, OAL Sur., 5 miles S Avoca. IP 150 BOPD, ¼-in., 40°, TP 47 psi., GOR 350, top Flippen lime pay 1,936 ft., TD 1,950 ft.

NORTH TEXAS

Archer County: Akin & Dimock 1 Vieth, Lot 60, Blk. 3, Clark & Plumb, 2½ miles S Scotland. Previously drilled dry to 5,300 ft. New TD 5,646 ft., pay 5,550 ft., IP 270 BOPD, 8/64-in., TP 1,000 psi., 40°, Mississippian pay.

Grayson County: Trans-Tex Drilling Co. 1 Dryden, T. W. Randolph Sur., A-1524, 3 miles SE Sadler. IP 225 BOPD, ¼-in., 33°, TP 600 psi., GOR 250, Oil Creek sand 6,143-72 ft. TD 6,185 ft.

Jack County: Warren Petroleum Corp. 5 Yates, W. Redfield Sur., A-506, 4 miles N Vineyard. IP 15 BOPD, 18/64-in., 44°, TP 375 psi., GOR 1,875, conglomerate perforations 5,059-65 ft. TD 5,604 ft.

Young County: Cabot Carbon Co. 2-B Adams, W. H. Bryant Sur, 5½ miles SW Bryson. IP 140 BOPD, 32°, GOR 528, Caddo 4,147-63 ft. TD 4,291 ft.

A. F. Knappenberger 1 Weldon, Sarah Lytle Sur., A-1334, 2 miles NE Bunger. IP 174 BOPD, 14/64-in., 40°, TP 200 psi., GOR 600, Strawn 3,002-20 ft. TD 3,209 ft.

WEST TEXAS

Crockett County: Pan American Production Co. 1 University M-40426, 28-38-University Lands, 10 miles SE Barnhart. IP 7 BOPD, ½-in., TP 125 psi., GOR 77,938, 59.7°, Ellenburger pay 8,174 ft. TD 9,051 ft.

Runnels County: Sojourner Drilling Co. 1 Byers, Steven F. Austin & Sam M. Williams Sur. 262, 11 miles NE Ballinger. IP 105.6 BOPD, 20/64-in., 40°, GOR 50, TP zero, Jennings sand 3,664-72 ft. TD 4,006 ft.

Sutton County: Sinclair Oil & Gas Co. 1 Mittel, 121-A-HE&WT, 7 miles N Sonora. IP 290 M.c.f., pay 5,842 ft. TD 7,417 ft.

NORTHERN NEW MEXICO

Rio Arriba County: Continental Oil Co. 2 Jicarilla, SW SE NW 20-25n-4w. IP 3,156 M.c.f. of gas per day, Pictured Cliffs discovery, new field. TD 3,395 ft. Pictured Cliffs.

ILLINOIS

Gallatin County: D. Lambert 1 Rister, SE NE SE 5-8s-9e. IPP 4 BOPD, Cypress

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sand 2,682-2,712 ft. TD 3,100 ft. (Oil discovery.)

Saline County: Calvert Drilling Co. 2 Bona, NW SW NW 23-8s-5e. IPP 40 BOPD, Paint Creek 2,676-84 ft. TD 3,043 ft. (Opens Harco oil pool.)

W. C. McBride 1 Flanders, SW NE SE 10-8s-7e. IPF 1,140 BOPD, Waltersburg sand 2,117-36 ft. 3,040 ft. (Extends North Eldorado pool.)

INDIANA

Posey County: Bert Redgrave 1 Hanshoe, NE NE NW 35-8s-14w. IPP 14 BOPD, Aux Vases sand 2,672-90 ft. TD 2,896 ft. (Opens Piroque South pool.)

KENTUCKY

Henderson County: Stouder Drilling Co. 1 Priest, NW SW SW 6-P-25. IPP 152 BOPD, 2,254-59 ft. TD 2,261 ft. (Extension and new pay at Elam Flats.)

MICHIGAN

Montcalm County: E. Edwin Brehm 1 Jeppesen, NW SE NE 3-11n-7w, Alpena Traverse 2,995 ft., AIP 15-25 BOPD, Pay 3,025-34 ft. TD 3,448 ft., Dry in Dundee (New pool—Douglas "3.")

Muskegon County: R. W. Devine & J. W. Lang Co. 1 Sklepinski, SW NE NE 28-9n-14w. Traverse lime 1,862 ft., IPF 6 BOPH. TD 1,863 ft. (Extension, Ravenna pool).

Tuscola County: Byron A. Bartlett 1 Elek, NE SW SE 23-14n-7e. IPF 30 BOD from Richfield pay 3,778-89 ft. TD 3,901 ft., PBTD 3,802 ft. (New, deeper pay in Akron pool.)

Washtenaw County: W. C. Taggert 3 Wilson-Buers, NW SE SW 1-1s-7e. Trenton 4,012 ft., 5,350,000 cu. ft. gas from pay at 4,212-24 ft. TD 4,224 ft. (New gas pay in Northville pool.)

Wayne County: Woodson Oil Co. 1 Daughter of St. Mary of Providence, SE SW NE 17-1s-8e. Trenton 3,989 ft., est. 2,000,000 cu. ft. gas. TD 4,419 ft. (Extension of Trenton gas pay Northville pool.)

NORTH LOUISIANA

Franklin Parish: Marshall Steffenson A-1 Baker, 35-16n-9e. IP 1,000 M.c.f. of gas per day and unestimated amount of condensate, 10/64-in. Tuscaloosa 5,169-75 ft. TD 5,306 ft. (Discovery well of Baker field.)

ARKANSAS

Union County: Spartan Drilling Co. 1 Jerry, C SW SE SE 29-17s-14w. IP 9,000 M.c.f. of gas per day, Tuscaloosa 3,085-87 ft. TD 5,220 (Gas discovery.)

Lawton Oil Corp. B-1 Olin, C SE SW 7-18s-13w. IPF 5 BOPD, 12/64-in., 18°, Meakin sand 2,565-76 ft. TD 2,576 ft. (Hillsboro outpost.)

Exploration Drilling, Inc. 1 Wooley, 28-18s-17w. IPP 70 BOPD, Hill sand 3,162-64 and 3,168-69 ft., 42°. TD 3,208 ft. (New pay in Schuler field.)

OKLAHOMA

Beaver County: United Producing Co. 2 Evans, C SW NE 18-5n-25eCM. IPF 88 BOPD, 4,400 M.c.f. of gas per day, 6,412-52 ft., ¾-in., 43°. TD 6,923 ft.

CALIFORNIA

Kern County: Reserve Oil & Gas Co. 41A Reserve-Pauley, NE NW 34-11n-19w, IPF 80 BO in 11 hours, 20/64-in. choke, 18° gravity perfs. 2,735-2,805 ft., TD 2,805 ft. (New Transition, Pliocene-Miocene, pool in Tejon-Grapevine field.)

Orange County: Hancock Oil Co. 1 Alamitos Land, 13-5s-12w, IPF 400 BOPD, 22/64-in. choke, 30° gravity, perfs. 7,298-7,379 ft., TD 8,976 ft. (New fault-block pool in Sunset Beach area, 1½ miles northwest of Burt Aston 2 Lomita discovery.)

WYOMING

Natrona County, Grieve Unit: Forest Oil Corp. 1 Morton 22-1, NE SE NW 22-32n-85w. IPF 1,220 BOPD, Muddy discovery, new field. TD 7,288 ft. Sundance.

COLORADO

Logan County: New Drilling Co. 1 Allan, C SE SW 35-10n-54w. IPP 127 BOPD, "J" sand oil discovery, new field. TD 5,090 ft. "J" sand.

Washington County: New Drilling Co. 1 McFarland, C NE NE 4-3s-56w. IPP 26 BOPD, "J" sand oil discovery, new field. TD 5,225 ft. "J" sand.

J. M. Thomson 1 Heiserman, SE SE SW 25-3n-50w. Shut in gas well. "D" sand discovery, new field. TD 4,070 ft. "J" sand.

Kingwood Oil Co. 2 Snyder, C SW SE 2-2n-54w. IPF 27 BOPH, ½-in. choke. "J" sand discovery, new field. TD 4,859 ft. "J" sand.

SASKATCHEWAN

Imperial 9-26 Nottingham, LSD 9, 26-4-32w1. Mission Canyon oil well. TD 3,625 ft.

ALBERTA

Merrill-Sun 4-19 Brooks, LSD 4, 19-18-15w4. Basal quartz oil well. TD 4,630 ft.

Stanolind-Hudson's Bay 1 Pembina Crown "G," LSD 16, 35-47-9w5. Cardium oil well. TD 5,564 ft.

Socony-CPR 28-7 Wintering Hills, LSD 7, 28-26-20w4. Viking gas well. TD 4,860 ft.

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Professor of Petroleum Geology at the University of Wichita

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PERSONALS

Experience Pays

Winter moves up again after return to U. S.

FEW oil-company executives have had broader experience in various divisions of the industry than has Henry E. Winter, who was recently promoted by Standard Oil Co.((N. J.) to regional executive for South American producing.

Winter, a native of Denver, started his oil carrer while he was still in high school at Casper, Wyo. He joined Standard Oil Co. of Indiana as a sample boy in the Casper refinery and worked there 2 years.

At that time, the Indiana company was building a refinery at Aruba, in the Netherlands West Indies, and quite a few people were being sent down from the Casper plant. It was natural for young Winter to decide that was where his future lay, too.

Detours . . . But Winter was detoured several times before reaching Latin America. First, he decided to go to college. When he got his chemical-engineering degree from the University of Nebraska in June 1934, he found jobs were scarce, both here and in Latin America.

His first job after graduation was with The Texas Co. at its Casper refinery. He worked there as a chemist for a year and a half before finally making connections to go to Aruba.

In the meantime, the Aruba refinery, along with other South American properties of the Indiana company had been sold to Standard of Jersey.

Career with Jersey . . . Joining the Jersey Standard organization in November 1935, Winter went to Aruba as a student engineer for Lago Oil & Transport Co. There he switched to technical services and worked on refinery yields, product quality, and royalty calculations.

His diverse experience started paying off quickly. Standard Oil Co. of Venezuela, Jersey's former operating company there, wanted a man with his background, and Winter was transferred to Caracas as a member of the Venezuela company's coordination department.

Winter remained with Jersey Standard affiliates in Venezuela from 1939 until August 1954, when he was transferred to the producing coordination group of the parent company. His latest promotion became effective last month.

Meanwhile, Winter had gained experience in still other branches of the petroleum industry. In 1948, when Creole Petroleum Corp. organized its economic department, Winter became its first manager. Four years later, he was transferred to Quiriquire in Eastern Venezuela as assistant superintendent of that district. He later moved up to district superintendent, and in August 1953 he was transferred again—this time to Maracaibo, Venezuela, where he became manager of the western division.

Now only 42, Winter can look back on nearly 19 years of valuable experience in virtually all phases of the oil industry in South America.

Since returning to this country, Winter has made his home at Summit, N. J. He is married and has five children, four of whom were born in Venezuela.

Charles F. Hunkins has been appointed manager of geology and engineering of the oil development department by Northern Pacific Railway Co. Hunkins, a petroleum engineering graduate of the University of California, joined Northern Pacific as chief engineer in October 1952.

Charles E. Yager, who resigned last month as president of Texas Pacific Coal & Oil Co., Fort Worth, has joined Southland Royalty Co., Fort Worth, and will serve in an executive capacity with that firm. Yager had worked for Texas Pacific Coal & Oil continuously in various capacities since 1923. He became chief geologist in 1929, manager of exploration in 1936, vice president in 1939, executive vice president in 1941, and president in 1949.

W. P. Lincoln, former superintendent of Natural Gas Pipeline Co. of America's compressor station 105 at Glasco, Kans., has been transferred to the same position at Station 108, Truro, Iowa. **L. L. Stallard,** former superintendant of station 102 at Gray, Okla., will succeed Lincoln at Glasco. **K. L. Bishop,** former plant engineer at station 303, Lufkin, Tex., of Texas Illinois Pipeline Co., a companion firm of N.G.P.L., has been transferred to station 102 as superintendent.

JAMES W. ROCHE

James W. Roche, former production manager for the Denver division of Shell Oil Co., has been promoted to production superintendent for the Denver area. **Frederick J. Toth,** former manager of production for Shell at Billings, Mont., has been promoted to succeed Roche at Denver. **Eldon A. Davenport,** former

F. J. TOTH

E. A. DAVENPORT

division production manager of the Illinois division at Centralia, has been transferred to Billings, where he will succeed Toth.

William O. (Bill) Butler, superintendent of the central coast division of Union Oil Co., has been promoted to manager of all field operations for the company. Butler, who has been with the company since 1930, has been division superintendent since 1945.

E. S. Bleecker, former manager of Eastern Hemisphere operations for Gulf Oil Corp., has been named exploration coordinator for the newly created London division production office. Bleecker joined the Gulf organization as a geologist with South American Gulf Oil Co. in 1919. Other appointments announced by the London office are **E. E. Ferrin,** production coordinator; **R. W. McClenahan,** concessions coordinator; **S. O. Gasperina,** finances and services coordinator; and **Gus Pyre,** staff assistant to the exploration coordinator. The London office will be

PERSONALS

in charge of all Gulf operations in the Eastern Hemisphere, which include the Kuwait oil concession, participation in the Iranian consortium, and a concession owned by a subsidiary at Ragusa, Sicily.

Newman Shell of Cities Service Oil Co. is the new president of the Geophysical Society at Casper, Wyo. Other new officers are **George Meade,** Stanolind Oil & Gas Co., vice president, and **Wesley Farmer,** Richfield Oil Corp., secretary-treasurer.

Everett M. O'Connell, geologist for Kewanee Oil Co., has been named head of the firm's recently established offices at Wichita. O'Connell served with Republic Natural Gas Co. and Cooperative Refinery Association in Wichita before joining Kewanee.

John O. Rundle has been elected vice president in charge of operations by Loffland Brothers Co. Rundle, who is presently vice president in charge of operations of Loffland Brothers Co. of Venezuela and Loffland Brothers Co. of Peru, succeeds B. B. Smith, deceased. Rundle will continue to be in charge of all the company's foreign subsidiaries, including Loffland Brothers Co. of Canada. Rundle joined Loffland Brothers in 1928 and served in various capacities in the operating department in Oklahoma, Utah, Colorado, West Texas, and the Gulf Coast until 1943, when he was transferred to Canada to supervise drilling operations at Prince Edward Island, Nova Scotia. After 2 years in Nova Scotia, he moved to Cuba for 10 months. He was elected vice president of Loffland Brothers of Venezuela in 1947 and has been there since. He will move to the Tulsa offices.

Norris N. Requist has joined Husky Oil Co. as district geologist in Midland, Tex. Before going with Husky, Requist served as a geologist with Magnolia Petroleum Co. at Oklahoma City, Midland, Tex., and San Antonio for 6 years

Theodore G. Fisher has joined Wilcox Oil Co. at Tulsa as a geologist. Fisher had been working as a consulting geologist in Oklahoma City for the past year. For 18 years before going into consulting work, he was with Cities Service Oil Co.

John C. Weyeth, geologist with Continental Oil Co. at Vernal, Utah, has been transferred to the firm's Salt Lake City office.

Don Montgomery, president of Montgomery Drilling Co., El Dorado, Ark., has been named to the Arkansas oil and gas commission by Gov. Francis Cherry, Montgomery, whose term extends through 1957, replaces Ed Hollyfield, who died December 21.

Myron E. McKinley, assistant geologist with the Oklahoma Geological Survey at the University of Oklahoma, has resigned to accept a position with Standard Oil Co. of Texas at Ardmore, Okla. McKinley had served with the survey staff since 1950 and is well known for his photographs and writings on the formations in the Arbuckle Mountains near Ardmore.

Thomas A. Aldridge, vice president and general manager of sales for American Oil Co., has assumed the duties of vice president in charge of marketing and been elected a member of the board of directors. Aldridge replaces **Herschel C. Smith,** who retired in December after 28 years with the company. **Hugh E. Jackson,** former assistant general manager of sales, has been named to succeed Aldridge as general manager of sales.

Richard G. Watts has been promoted by Magnolia Petroleum Co. from assistant chief civil engineer to chief

R. G. WATTS

C. J. COLMAN

civil engineer at Dallas. Watts fills the vacancy left by the retirement of **E. E. Holstein.** Replacing Watts as assistant chief civil engineer is **Clare J. Colman,** of the firm's Dallas civil engineering staff. Watts joined Magnolia in 1935 and was named assistant chief civil engineer in 1940. Colman joined Magnolia immediately after being graduated from the University of Kansas in 1948. He worked for the company as a district engineer at Lake Charles, La., and as a division engineer at Oklahoma City before being transferred to Dallas last summer.

H. L. PHILLIPS

Henry L. Phillips, chairman of the board of Sinclair Oil & Gas Co., crude-oil producing subsidiary of Sinclair Oil Corp., and vice president of the parent company, retired from active duties has retired from active executive duties. Phillips will retain his positions as a member of the board of both companies. Phillips joined Sinclair Oil & Refining Corp. in Tulsa on July 5, 1916, just 2 months after H. F. Sinclair founded the organization which has grown to the present billion-dollar Sinclair Oil Corp. Phillips was also one of the founders and first president of Platte Pipe Line Co., in which Sinclair has a part interest.

E. J. Schiffer, general traffic manager of Gulf Oil Corp. and subsidiary companies, has retired after 39 years of service. Schiffer joined Gulf in 1915 in Pittsburgh and was named assistant general traffic manager in 1945. He was named to the top traffic position in 1947. **W. M. Johnson,** assistant general traffic manager, has been selected to succeed Schiffer. **G. J. Kuech** has been named assistant general traffic manager to succeed Johnson.

M. E. Schwartz, vice president and manager of the Mid-Continent area of Seaboard Oil Co., has been named head of all field operations and appointed assistant to the executive vice president in Dallas. **J. W. Rawley,** assistant manager of the Mid-Continent division, has been elected a vice president and manager of the Mid-Continent area. Other promotions announced by Seaboard were **H. B. Rainbolt,** assistant manager of the Mid-Continent division's land department, named manager; **E. H. Watkins,** supervisor, promoted to assistant manager; **J. M. Clayton,** coordinator of the geological and geophysical departments of the Mid-Continent division, appointed to this position for all company operations; **H. H. Lawson,** manager of the land department in the western division at Denver, promoted to assistant to the vice president and manager of the western division; **R. M. Bisehoff,** administrative assistant to the executive vice president in Dallas, named assistant manager of production in the western division; **E. R. Smith,** district production superintendent of the California district, appointed reservoir engineer of the Mid-Continent division; and **J. N. Conley,** regional geol-

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2767

PERSONALS

ogist in the Abilene, Tex., district, advanced to chief geologist of the western division.

R. O. Van Fleet, production superintendent with Blanco Oil Co., has been transferred from Alice, Tex., to San Antonio.

Floyd E. Hendrix has been transferred to the Midland, Tex., district as a foreman by Sohio Petroleum Co. Hendrix had been serving as a foreman at Russell, Kans. **Lowell L. Smith,** assistant foreman at Russell, has been promoted to foreman to succeed Hendrix. **Arthur L. Brown** has been promoted to assistant foreman at Russell, and **Burl B. Pyle,** senior well tester at Pauls Valley, Okla., district, has been advanced to assistant foreman there.

DR. R. W. KREBS

Dr. Robert W. Krebs, an assistant director of Esso Laboratories at Baton Rouge, has been promoted to associate director. Krebs succeeds **Dr. Roger W. Richardson,** who has been named associate manager of refinery liaison with Standard Oil Development Co. in New York. Other promotions announced by Esso Laboratories were **Dr. Lindsey I. Griffin, Jr., Frank B. Johnson,** and **Charles N. Kimberlin,** assistant directors; and **Dr. Robert E. Wood,** acting assistant director.

John J. Arps has been promoted by British - American Oil Producing Co. from assistant to the executive vice president to vice president in charge of the economics and evaluation department at Dallas. Arps, a native of the Netherlands and graduate of the Technical University of Delft, Holland, joined British-American as district engineer for the Gulf Coast area in 1940. Since then, he has held successive positions as chief engineer, acting production superintendent, and assistant to the executive vice president. Prior to joining British-American, Arps worked for another oil firm in eastern Europe, the Far East, South America, and the United States. He played key parts in the successful completion of British-American's first offshore producer 2 miles off the coast of Texas in 1941 and in the planning and installation of the big pressure-maintenance program in Wyoming's Steamboat Butte field.

R. M. Honeycutt, former foreman with Transcontinental Gas Pipe Line Corp. at Appomattox, Va., has been transferred to the same position at Reidsville, N. C.

Bascom Giles, commissioner of the General Land Office for the State of Texas, resigned last week to enter private business. He was succeeded by **Col. J. Earl Rudder,** Brady, Tex. Giles, a veteran commissioner who served in the land department for many years, was author of "Lots of Land," a book tracing the unique history of the public domain in Texas *(The Oil and Gas Journal, May 24, 1954, page 178).*

R. E. Baker, former chemist with General Petroleum Corp. at Santa Fe Springs, Calif., has been promoted to foreman by the company and transferred to Athens, Calif.

Howard J. Speer, geologist for Tide Water Associated Oil Co. at Casper, Wyo., has been promoted to district geologist at its recently established office at Billings, Mont.

W. A. Scott has been promoted to division exploitation engineer by Shell Oil Co. at Billings, Mont. Befort his promotion, Scott was an exploitation engineer in the company's technical services division at Houston.

William L. Burt has been elected president of Goodrich-Gulf Chemicals, Inc., a jointly owned firm of Gulf Oil Co. and B. F. Goodrich Co. Burt succeeds **William S. Richardson,** president of B. F. Goodrich Co., who will continue as a member of the board.

James R. Gregath has been named drilling engineer by Helmerich & Payne, Inc. Gregath began his oil industry career as a development engineer with Richfield Oil Corp. at Long Beach. In November 1948 he joined Kuwait Oil Co., Ltd., in Kuwait as a reservoir engineer and was later advanced to drilling engineer. After returning from Kuwait, he joined Gulf Oil Corp. as a drilling engineer.

H. E. Cobb, Jr., former engineer with Deep Rock Oil Co. at Wichita Falls, Tex., has been promoted to district engineer by General American Oil Co. of Texas at Abilene, Tex. Cobb joined General American on October 1, when General American purchased Deep Rock's producing properties.

William L. Craig has been named head of the newly established Tyler, Tex., office of Evans Production Corp., of Dallas. Craig formerly was with Degolyer & MacNaughton for 4 years, and Arkansas Louisiana Gas Co. as assistant chief petroleum engineer for 6 years.

DEATHS

Dr. William M. Burton, 89, retired president of Standard Oil Co. (Ind.), died recently in Miami, Fla. Burton, who served as president of the company from 1918 to 1927, was often called the father of modern refining technology for a cracking process he discovered to make more gasoline out of crude oil. Burton joined Standard Indiana at Whiting, Ind., in 1890 as a chemist. He became general superintendent in 1895, a member of the board of directors in 1911, and a vice president in 1915. In 1947, Dr. Burton was awarded the American Petroleum Institute Gold Medal for Distinguished Achievement.

John Lloyd Pryor, 72, former natural-gasoline plant engineer with Oklahoma Natural Gas Co., died recently at his home in Sapulpa, Okla. He had retired from the company in 1947.

Gerome B. Carr, 78, retired executive of Wilshire Oil Co., died recently at his home in Los Angeles.

Frank M. Balling, 65, retired director and president of Esso Export Corp., an affiliate of Standard Oil Co. (N. J.), died recently at his home. Balling, who had 46 years of service with Standard Jersey companies, began his career as an office boy.

Daniel Archibald McDougal, 90, one of the first operators in the Glenn Pool field near Tulsa, died January 5 at Coral Gables, Fla. McDougal was also active in other Oklahoma fields and in Texas.

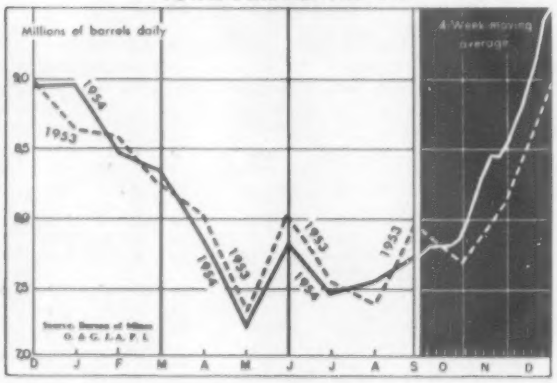
L. H. (Harry) Angove, 86, retired district superintendent of Sinclair Oil & Gas Co., died January 5 at his home in Bowie, Tex.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,336,000	DOWN	29,900	UP	190,710
Crude stocks	265,391,000	DOWN	102,000	DOWN	8,126,000
Completions	884	DOWN	218	UP	12
Refinery runs	7,296,000	UP	8,000	UP	94,000
Gasoline stocks	157,228,000	UP	2,306,000	DOWN	799,000
Four-product stocks	347,501,000	DOWN	2,831,000	DOWN	1,994,000
Total imports	1,443,700	UP	356,500	UP	339,300

TOTAL DEMAND—ALL OILS



Higher Distillate Prices Required for East Coast Points

CURRENT cargo prices for kerosine and distillate fuels on the Gulf Coast, combined with higher spot tanker rates, indicate a need for higher prices on the East Coast.

For the first part of the heating season, the New York Harbor price for barge deliveries of No. 2 fuel was 9.35 cents a gallon. The price moved up 0.6 cent a gallon in the first week of December to 9.95 cents.

The cargo price for No. 2 on the Gulf Coast in the early part of the season was 8.5 cents a gallon. The increase of 0.25 cent early in December was followed by another 0.25-cent boost at the end of the month. These increases cover all but 0.1 cent of the East Coast rise.

In addition to the increased cost of fuel at the Gulf Coast, higher tanker rates have added to the over-all delivered cost on the East Coast. As late as September, spot quotations for clean tankers in the Gulf-East Coast trade ranged about 20 per cent under the Maritime Commission base or about 0.72 cent a gallon. Current rates are reported to be about USMC plus 12 per cent or 1.01 cents per gallon. This represents a gain of almost 0.3 cent a gallon.

Thus, increased cargo prices plus increased spot tanker rates represent a boost in cost of 0.8 cent a gallon compared with the 0.6-cent increase in barge prices in New York Harbor. Current cargo price of 9.0 cents on the Gulf Coast and 1.01 cents spot tanker rate to the East Coast add to a minimum of 10.01 cents per gallon compared with the barge price of 9.95 in the harbor.

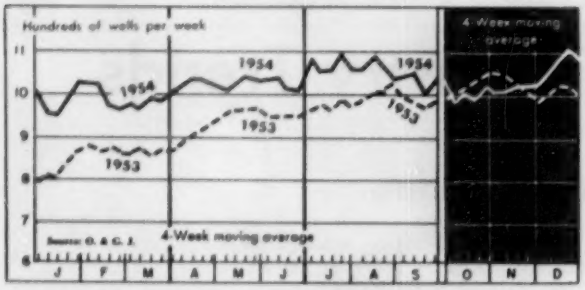
Secondary buying . . . This indicated need for higher prices on the East Coast has been the basis for rumors of another increase in quotations for barge deliveries. In turn, these rumors of higher prices have stimulated purchases by secondary suppliers. Purchases for secondary storage have come at a time when actual consumption is near the winter peak, resulting in an abnormally tight market for most of the East Coast.

If the current wave of buying on the East Coast is followed by cold weather and high consumer demand, the market will remain strong for all of the heating season. On the other hand, even a short period of very warm weather in January will cause secondary suppliers to cut their inventories to a minimum at a time when consumption is down, setting the stage for a soft market that could last for most of the season.

Firm Group 3 markets . . . No. 2 distillate in the Mid-Continent reached a low of 8.0 cents a gallon last summer and was up to only 8.25 cents as late as the last of September. The current spot price of 8.875 cents indicates the strength picked up by the market, most of it in December.

Residual fuel dropped to $0.90 a barrel last summer and now is back up to $1.50 on the low which was the prevailing price a year ago. At this price residual is meeting some competition from coal.

TOTAL COMPLETIONS



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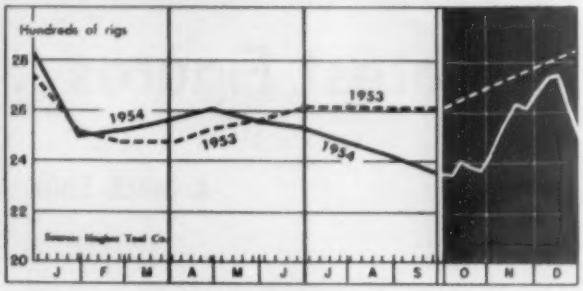
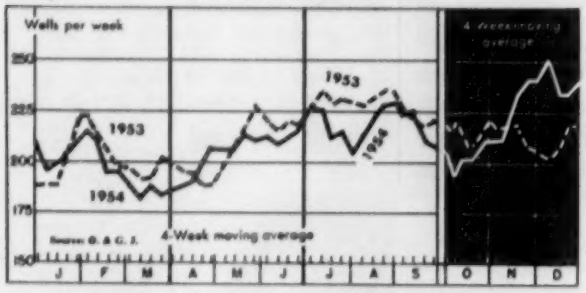


WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

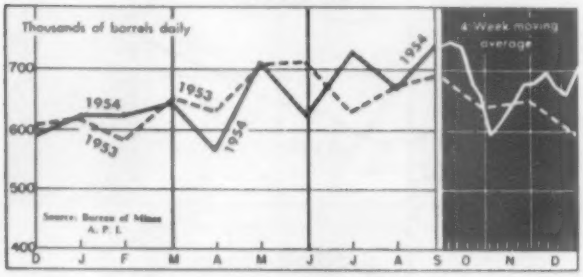
Area—	1-3-55	Change from 12-27-54	Change from 1-4-54
Gulf Coast	572	— 30	— 17
N. and W. Texas-New Mexico	799	— 13	35
Arkansas-N. Louisiana-E. Texas	198	1	25
Oklahoma	252	— 56	—101
Kansas-S. Nebraska	169	— 8	32
Illinois-Eastern	123	— 16	— 2
Rocky Mountain	232	— 17	— 49
Pacific Coast	151	1	— 18
Total United States	2,496	—138	— 95
Western Canada	187	— 9	43

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 1, 1955

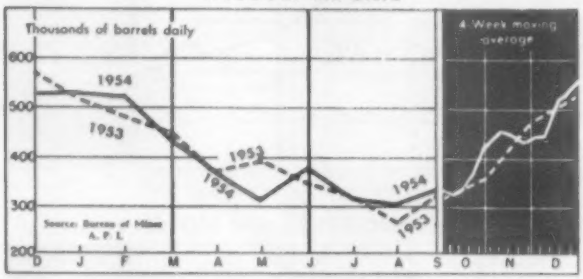
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dist.	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	3,404	101	140	0	0	0	0	0	2	0	2	89	93
Arkansas	17	9	1	7	49,603	665	573	2	0	1	4	7	27	0	6	124	157
California	41	29	1	11	191,481	2,353	2,578	2	0	0	8	10	58	1	15	498	572
Colorado	31	11	1	19	166,331	1,376	734	3	0	1	13	17	43	0	22	581	646
Illinois	0	0	0	0	0	3,135	2,165	0	0	0	0	0	27	0	1	433	461
Indiana	0	0	0	0	0	887	1,280	0	0	0	0	0	9	0	1	214	224
Kansas	74	47	0	27	256,548	4,722	4,783	4	0	0	13	17	138	0	34	639	811
Kentucky	8	0	7	1	19,301	1,188	1,164	0	0	0	0	0	18	0	6	149	173
Louisiana	55	32	5	18	289,985	3,611	2,828	0	0	1	7	8	100	53	46	371	570
North	39	20	5	14	136,245	2,010	1,295	0	0	1	6	7	18	3	20	173	214
South	16	12	0	4	153,740	1,601	1,533	0	0	0	1	1	82	50	26	198	356
Michigan	10	4	2	4	34,453	567	623	3	0	2	4	9	22	0	2	219	243
Mississippi	13	5	0	8	95,153	441	397	0	0	0	8	8	10	1	0	167	178
Montana	8	2	1	5	20,727	345	451	0	0	0	4	4	7	0	3	116	126
Nebraska	18	4	0	14	97,917	459	320	0	0	0	14	14	24	0	4	155	183
New Mexico	24	16	6	2	130,393	1,117	1,418	0	0	1	1	2	24	3	21	109	157
Northwest	5	0	5	0	18,346	378	627	0	0	1	0	1	4	0	19	44	67
Southeast	19	16	1	2	112,047	739	791	0	0	0	1	1	20	3	2	65	90
North Dakota	10	9	0	1	75,150	315	270	0	0	0	1	1	5	0	0	113	118
Ohio	24	6	7	*11	45,985	1,171	1,080	0	0	0	0	0	3	0	5	14	22
Oklahoma	80	40	4	36	303,607	8,786	7,593	2	0	0	18	20	156	0	25	678	859
Pennsylvania-New York	33	10	9	†14	72,500	1,766	2,203	0	0	0	0	0	0	0	5	47	52
Texas	402	233	19	150	1,845,342	18,865	17,003	10		4	99	113	756	67	163	4,204	5,190
Southwest (1 & 4)	58	35	5	18	191,049	2,630	2,705	2	0	1	11	14	91	22	43	728	884
Gulf Coast (2 & 3)	52	26	0	26	350,637	2,655	2,520	1	0	0	19	20	79	37	48	674	838
East (5 & 6)	34	15	6	13	192,864	1,053	808	0	0	0	8	8	16	0	14	304	334
North Central (7-B & 9)	138	69	0	69	464,588	7,138	6,465	5	0	0	44	49	361	4	22	1,715	2,102
West (7-C & 8)	105	81	1	23	582,184	4,431	3,735	2	0	1	16	19	205	1	25	707	938
Panhandle (10)	15	7	7	1	64,020	958	770	0	0	2	1	3	4	3	11	76	94
Utah	0	0	0	0	0	96	70	0	0	0	0	0	5	0	1	57	63
West Virginia	7	4	3	0	18,696	614	618	0	0	0	0	0	0	0	31	20	51
Wyoming	28	11	0	17	124,816	1,226	917	1	0	0	15	16	38	0	9	213	260
Miscellaneous	0	0	0	0	0	118	71	0	0	0	0	0	3	0	3	39	45
Total United States	**884**	472	66	346	3,841,392	‡53,924	§49,279	27	0	10	209	**246**	1,475	125	405	9,249	‡11,254
Total previous week	1,102	595	67	440	4,242,560			23	2	4	191	220	1,460	133	401	8,983	10,977
Total January 2, 1954	872	512	65	295	3,583,231			27	1	6	131	165	1,465	110	367	9,120	§11,062

Service wells included: *5, †6, ‡revised, §1953 total.

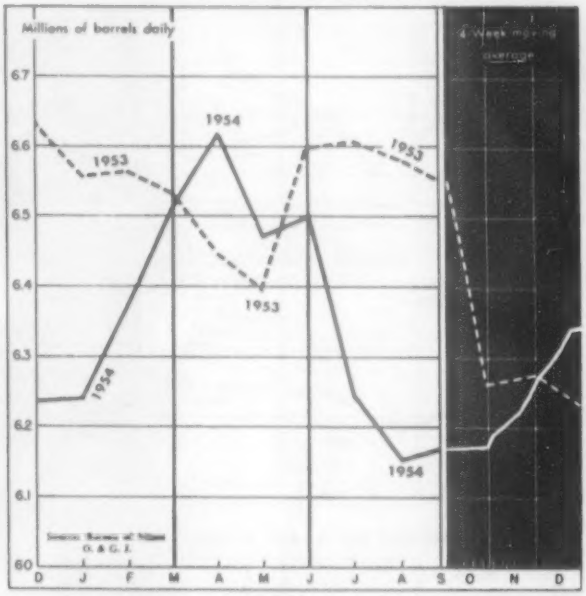
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

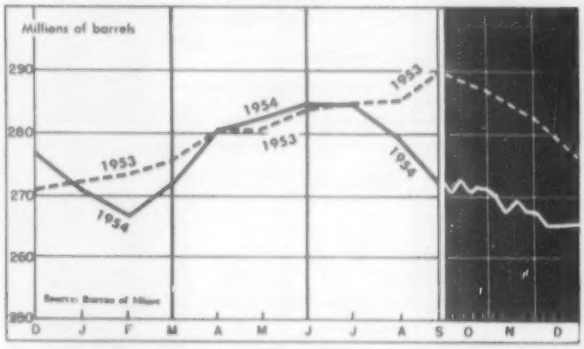


DAILY AVERAGE PRODUCTION FOR WEEK

	January 1 — Crude oil	Lease condensate	Total	Dec. 25 total
Alabama	3,900		3,900	3,900
Arkansas	71,800	350	72,150	71,900
California	964,300		964,300	965,700
Colorado	143,300		143,300	141,000
Eastern	51,800		51,800	51,000
Florida	1,400		1,400	1,400
Illinois	196,600		196,600	198,200
Indiana	29,300		29,300	28,900
Kansas	311,800		311,800	323,700
Kentucky	38,800		38,800	39,700
Louisiana	596,500	48,350	644,850	645,000
North	100,500	2,850	103,350	103,500
South	496,000	45,500	541,500	541,500
Michigan	31,900		31,900	31,900
Mississippi	89,500	3,800	93,300	93,300
Montana	35,200		35,200	35,800
Nebraska	23,500		23,500	22,900
New Mexico	212,550	2,550	215,100	215,200
North Dakota	23,400		23,400	21,200
Oklahoma	484,900		484,900	511,200
Texas	2,654,700	53,000	2,707,700	2,707,700
Dist. 1	46,000	475	46,475	46,475
Dist. 2	137,100	8,200	145,300	145,300
Dist. 3	416,000	25,000	441,000	441,000
Dist. 4	234,000	6,125	240,125	240,125
Dist. 5	43,000	500	43,500	43,500
Dist. 6	114,000	5,500	119,500	119,500
East Texas field	216,100		216,100	216,100
Dist. 7-B	129,500	25	129,525	129,525
Dist. 7-C	175,000	4,550	179,550	179,550
Dist. 8	868,000	1,975	869,975	869,975
Dist. 9	192,000	625	192,625	192,625
Dist. 10	84,000	25	84,025	84,025
Utah	4,400		4,400	4,300
Wyoming	258,100		258,100	251,700
Others	‡300		‡300	300
Total U. S.	6,227,950	108,050	**6,336,000**	6,365,900
Change from previous week, down			**29,900**	
Canada	†293,575		†293,575	†302,300
Total U. S. production January 1				6,336,000 bbl.
Same period last year (crude plus cond.)				*6,145,290 bbl.

*Includes 98,100 bbl. condensate. †Week ended previous Monday. ‡S. D. 100, Nev. 200.

CRUDE-OIL STOCKS



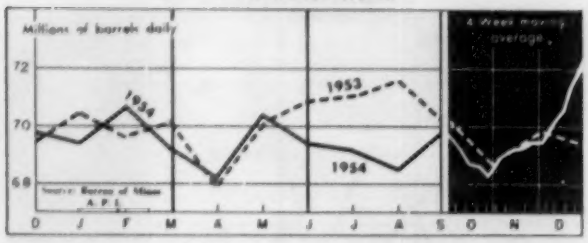
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

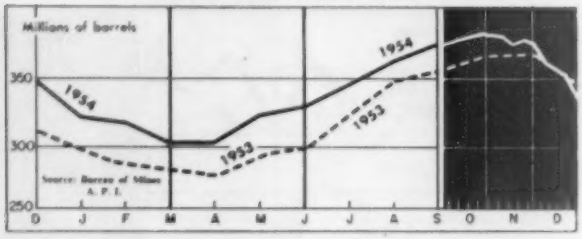
	Dec. 25, '54	Dec. 18, '54	Dec. 26, '53
Pennsylvania Grade	3,022	3,088	2,656
Other Appalachian	1,908	1,923	1,579
Illinois, Indiana, Michigan	12,139	12,208	11,952
Nebraska, N. Dakota	1,820	1,485	(‡)
Kansas	8,643	8,540	8,578
Oklahoma	25,617	25,774	26,649
Arkansas	3,025	3,013	3,298
Louisiana	15,527	14,876	16,939
North	2,478	2,441	2,826
South	13,049	12,435	14,113
Mississippi	2,687	2,930	3,654
New Mexico	8,662	8,886	9,054
Texas	119,775	120,807	127,407
East Texas proper	10,173	9,825	11,496
West Texas	54,360	54,444	54,520
Texas Gulf	23,059	23,714	26,273
Other Texas	32,183	32,824	35,118
Wyoming	14,416	13,515	13,723
Other Rocky Mountain	5,254	5,637	3,360
California	31,707	31,661	34,199
Foreign	†11,189	11,150	10,469
Total	265,391	265,493	273,517

*Bureau of Mines. †Includes 2,989,000 bbl. in California. ‡Included with Kansas.

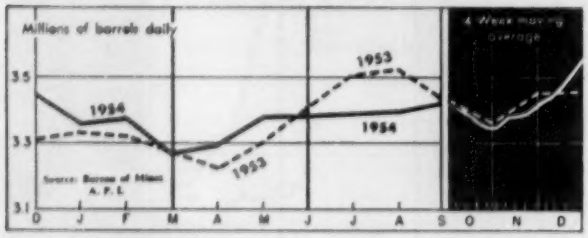
REFINERY RUNS



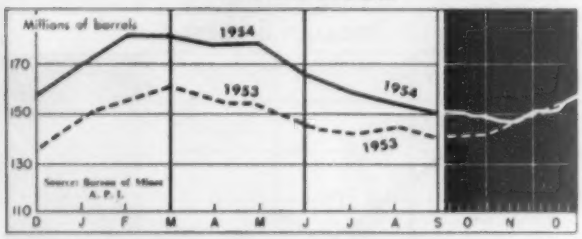
FOUR-PRODUCT STOCKS



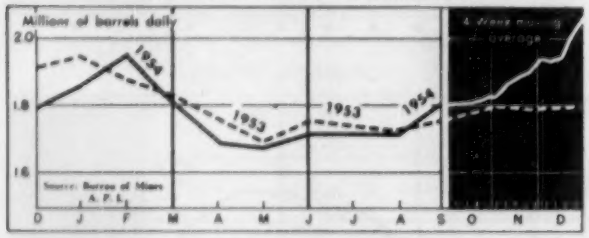
GASOLINE PRODUCTION



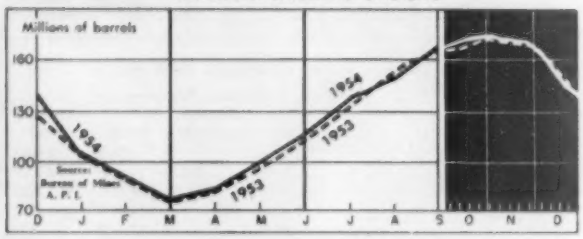
GASOLINE STOCKS



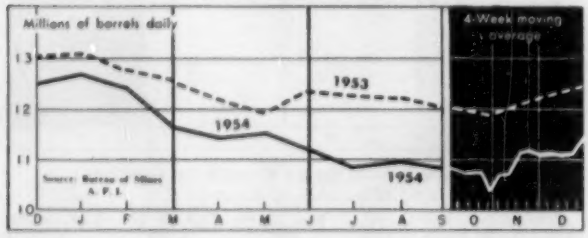
MIDDLE-DISTILLATE PRODUCTION



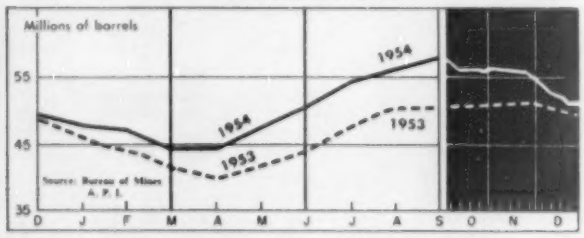
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, DECEMBER 31

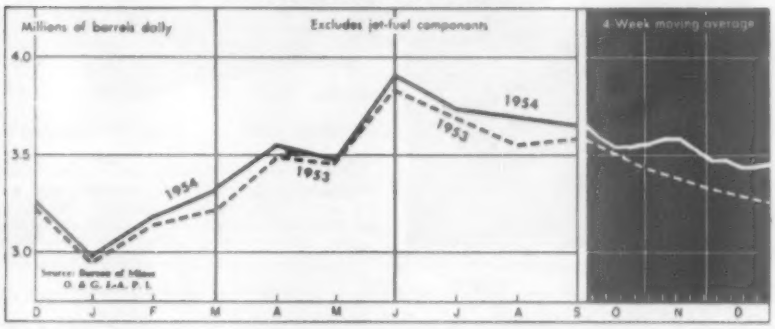
(Excludes all jet-fuel components)

(Thousands of barrels)

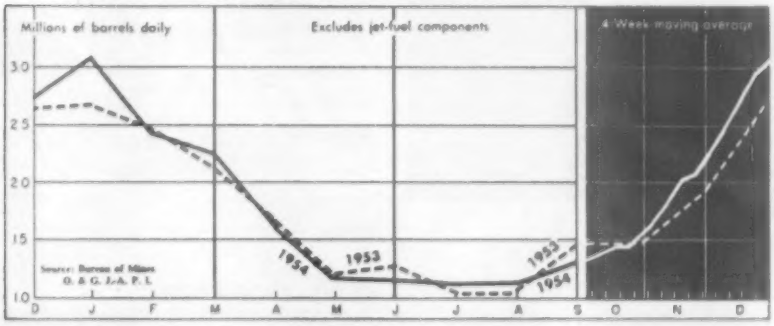
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, December 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,013	441.7	38.0	270.9	240.7	32,441	11,655	38,803	9,171	1,018	446.4	44.3	232.9	227.1
Appalachian:														
District 1	106	40.6	9.2	24.4	6.7	4,516	618	2,128	530	118	50.6	6.0	25.7	13.1
District 2	80	39.0	5.9	15.4	13.4	2,339	390	683	234	81	44.7	5.7	15.7	11.1
Ind., Ill., Ky	1,346	715.0	88.7	281.3	182.0	34,470	7,692	19,580	3,668	1,314	719.6	86.6	233.2	199.5
Okla., Kans., Mo.	660	385.8	21.1	171.0	49.0	15,224	1,968	11,577	1,951	572	353.4	11.1	124.3	48.7
Inland Texas	253	177.3	12.4	42.0	19.9	5,765	439	1,955	584	240	179.8	13.6	36.7	29.0
Texas Gulf Coast	1,823	860.6	128.1	468.3	235.4	23,408	2,891	14,522	4,378	1,655	812.3	128.7	399.2	243.6
La. Gulf Coast	601	305.7	53.6	171.6	30.4	10,693	2,375	4,156	1,177	549	288.9	60.7	134.3	50.2
N. La. and Ark.	88	33.3	5.4	20.3	7.9	3,712	582	1,573	148	83	35.6	10.3	19.3	7.0
Rocky Mountain:														
New Mexico	20	11.1	.....	3.0	2.9	201	.....	87	38	16	10.3	1.0	2.0	3.1
Other Rocky Mt.	241	113.9	5.7	61.7	36.4	5,978	251	2,135	801	244	123.0	4.2	55.8	41.4
California	1,065	493.0	4.2	162.4	362.6	18,481	420	12,432	28,681	1,074	464.4	5.4	161.6	373.0
December 31, 1954	7,296	3,617.0	372.3	1,692.3	1,187.3	157,228	29,281	109,631	51,361	6,964	3,529.0	377.6	1,440.7	1,246.8
December 24, 1954	7,288	3,538.1	397.4	1,739.9	1,148.9	154,922	30,521	113,817	51,072					
January 2, 1954	7,202	3,516.6	415.7	1,471.3	1,257.9	158,027	28,696	113,337	49,435					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.

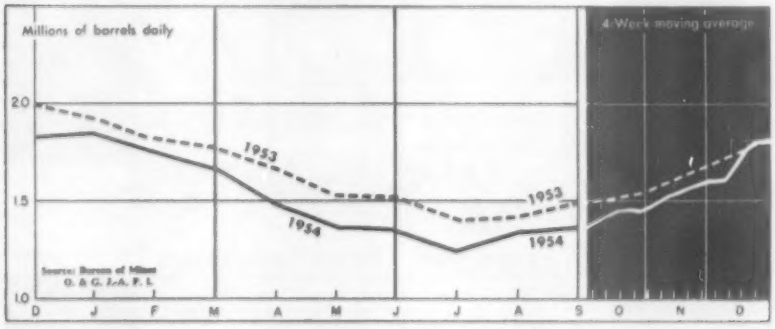
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of January 5, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.375-11	11.25-12	10.50-10.75
Premium gasoline	11.375-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9.75-9.875	10.7	9.5-9.75
No. 2 straw fuel oil	8.875-9.0	9.95	9.0-9.25
No. 6 residual	$1.50-1.60	$2.35-2.45	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Higher fuel prices on the Gulf Coast and in the Mid-Continent indicated general market trends for the week. Market studies slanted toward higher prices on the East Coast were reported. Kerosine, distillate and residual fuels moved up in the Mid-Continent.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 12-31-54	3,541	3,439
October 1954	3,457	3,513
December 1953	3,453	3,253
January 1954	3,354	2,985
Middle distillate:		
Four weeks ended 12-31-54	2,034	3,050
October 1954	1,854	1,513
December 1953	1,794	2,707
January 1954	1,857	3,076
Residual fuel:		
Four weeks ended 12-31-54	1,145	1,795
October 1954	1,066	1,448
December 1953	1,247	1,809
January 1954	1,271	1,831

SUPPLY AND DEMAND*

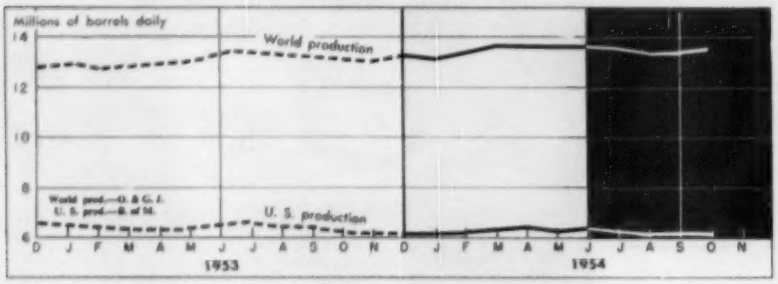
(Thousands of barrels daily)

	Oct. 1954	Oct. 1953
Domestic demand	7,411	7,305
Gasoline	3,407	3,336
Kerosine	299	296
Distillate	1,129	1,097
Residual	1,388	1,430
Jet fuel	143	114
Lubricants	106	109
L.P.G.	296	306
Other products	602	578
Crude loss	41	39
Exports	374	377
Gasoline	108	87
Kerosine	9	13
Distillate	76	84
Residual	60	90
Jet fuel		
Lubricants	40	40
L.P.G.	11	7
Other products	22	18
Crude	48	38
Total demand	7,785	7,682
Gasoline	3,515	3,423
Kerosine	308	309
Distillate	1,205	1,181
Residual	1,448	1,520
Jet fuel	143	114
Lubricants	146	149
L.P.G.	307	313
Other products	624	596
Crude exp. and loss	89	77
Stock change	108	243
Crude	—167	—67
Products	275	310
New supply	7,893	7,925
Imports	1,064	990
Crude	641	639
Products	423	351
Production	6,829	6,935
Crude	6,136	6,262
Natural gasoline, etc.	693	673
Runs to stills	6,834	6,872

*Bureau of Mines.

(The schedule of selected crude prices appeared on page 180 of the January 3 issue and will be printed again next week.)

CRUDE-OIL PRODUCTION

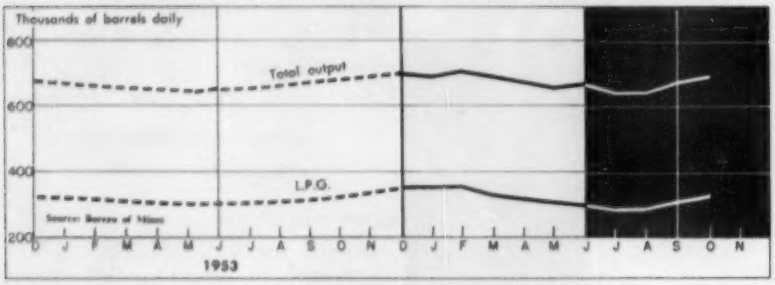


CRUDE PRODUCTION

(Thousands of barrels daily)

Month—	U. S.	World
October 1954	6,135	13,679
September 1954	6,151	13,432
August 1954	6,168	13,428
February 1954	6,379	13,365
October 1953	6,262	12,950

NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION

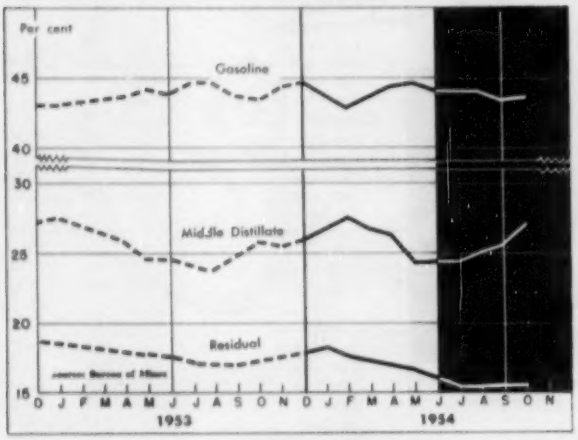


PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

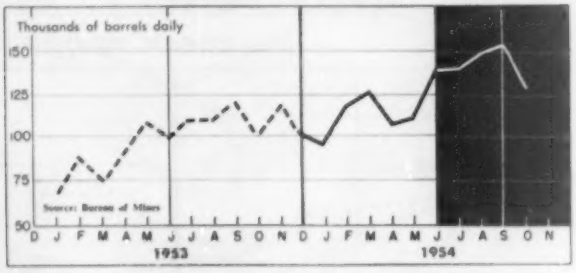
(Thousands of barrels daily)

Month—	L.P.G.	Total
October 1954	332	692
September 1954	315	676
August 1954	289	642
February 1954	356	705
October 1953	321	672

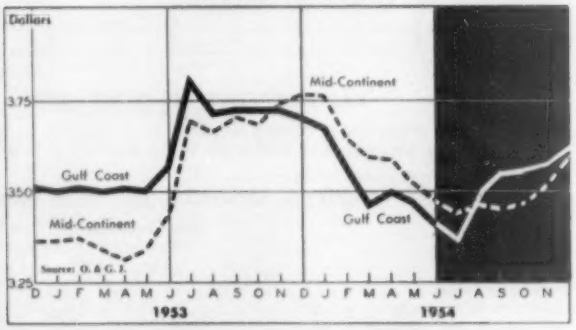
REFINERY YIELDS



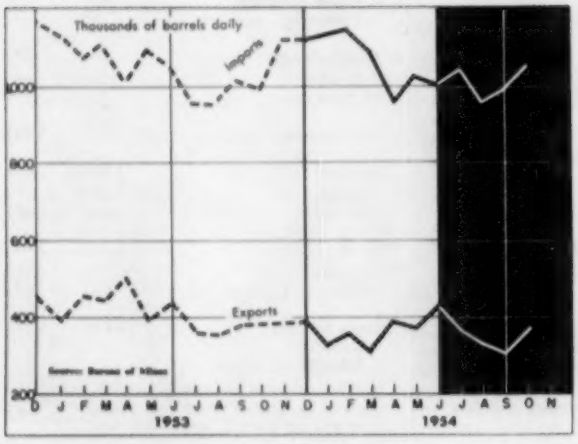
JET-FUEL PRODUCTION



REFINERY REALIZATION



IMPORTS-EXPORTS



REFINERY REALIZATION

	Dec.* 1954	Nov.* 1954	Oct. 1954	Dec. 1953
Mid-Continent	$3.61	$3.52	$3.55	$3.76
Gulf Coast	3.64	3.58	3.58	3.70

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

FOR SALE EQUIPMENT

1—MODEL RL 3-Drum Cardwell Powered with Buda Model 844D Diesel Engine. Rig and Engine in Perfect Condition. 1-87' 2-Pole Mast. Box H-404, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—Horizontal Duplex Steam Pumps—10x8½x12—353 GPM—bronze fitted—max. discharge pressure 100 lbs.—6" suction—5" discharge—mfg. by American Marsh Co. Quantity available—NEW—Boston Metals Co. 313 E. Baltimore St., Baltimore 2, Md., Curtis 7-5050.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126 Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

BEST NATIONAL 75 in Oklahoma. Complete L.C.M. derrick. New drill pipe. Plenty of extras. For inventory write Box H-562, The Oil and Gas Journal, Tulsa, Oklahoma.

CORE DRILLS-URANIUM. Power core drills for all depths. New and used spudders, rotaries, well drilling equipment and supplies. Compressors for air operation. Pressey & Son, Pueblo, Colo.

WILSON GIANT—Cheap; 2—Waukesha 145 GK engines in good condition; rig used for work-over. Includes Kelco spinning and Foster Breakout Catheads; pump drive and rotary drive. Call Madison 1923, Houston or Amherst 7-3311, Wichita, or write P. O. Box 2001, Wichita, Kansas.

FOR SALE: Cooper Type 80 Direct Gas Engine Driven Compressors, AS IS or reconditioned Compressor cylinders all sizes. W. S. Smith, 205 Thompson Bldg., Tel. 2-5473, Tulsa, Oklahoma.

COMPLETE STOCK of Diesel & Gas Generator Units, 50 & 75 KW Caterpillar Diesels, Buda, Cummins, G.M., Waukesha, Hercules, Kohler, 5 to 100 KW, both AC and DC. Give us your inquiries. Southwestern Supply & Equipment Co., P. O. Box 14357, Houston 21, Texas.

USED EQUIPMENT

Two Franks Model 4000-TM Single Drum Well Servicing Units. Single Pole Mast. Truck Mounted.
Franks Model Super East Texas Single Drum Well Servicing Unit. Truck Mounted. Handles 6500' work.
Franks Model East Texas Single Drum Well Servicing Unit. Single Pole Mast. Truck Mounted. Handles 5000' work.
Two Cardwell Models K5 Single Drum Well Servicing Unit. Single Pole Mast. Industrial engine. Mounted on trucks.

50/60 Ideco Skid Servicing Unit. Double Pole Mast. Mounted on International Tandem Truck.
Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.
O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Write, Wire or Call

FRANKS MFG. CORPORATION
BOX 3218, WHITTIER STATION
TULSA, OKLAHOMA

FOR SALE EQUIPMENT

FOR SALE: 3600' 4½" extra hole drill pipe, good for shallow drilling. $.90 per foot. Terms. Melton Supply Company, Box 1300, Seminole, Okla.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses. 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

SWEET GASOLINE Plant Liquidation: Heat Exchangers—1530, 310, 265, 65, 26 sq. ft. Columns—84" x 30'; 72" x 28'; 72" x 16'; 60" x 24'; 48" x 24', 42" x 44'; 36" x 42'; 24" x 45'. Tanks—Storage & Pressure, 100 to 25,000 gal. Compressors—14/11 x 20, 300 PSI; 14/12½ x 20, 175 PSI; 13" x 16", 75 PSI—all gas driven. Pumps—Centrifugal—1¼" to 8". Boilers—150 HP, gas fired, 150 PSI HRT. Misc.—Instruments, motors, stacks, pipe, etc. Heat & Power Co., Inc., 310 Thompson Bldg., Tulsa 3, Okla.—Phone: 3-4890. 70 Pine St., New York 5, N. Y.—HAnover 2-4890.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 133—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE EQUIPMENT

FOR SALE: 1—7¼" x 12" FZ-FXZ Gardner-Denver Pump unitized w/ Model 6LROU Waukesha Gasoline—Natural Gas—Butane Engine and #8A Demco Circulating Type Red Oiler. Pump has been in use less than 60 days. Box H-545, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—At our Oklahoma City warehouse, one Ingersoll-Rand 8" x 3¼" x 8" portable compressor, 1000# starting pressure, 500# operating pressure, price $1500.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

ANOTHER BRILL LIQUIDATION!

FORMER CONSUMERS COOPERATIVE REFINERY
LEVELLAND, TEXAS
(30 Miles West of Lubbock on Highway 290)

3'10" x 38" Vessel, 325# WP
5'3" x 38'6" Vessel, 90# WP, Chr. Lined
8—5000, 2000, 1200 bbl. Bolted Tanks
10—2000, 1000 bbl. Welded Tanks
6' x 58' x ½" Shell Fractionating Tower, chr. lined; built 1951, used 9 months.
6'6" x 55'; 6' x 27'; 5' x 27'; 3' x 49'; 30" x 35' Towers.
1800, (4)500 sq. ft. Adm Ht Exchangers.
600, 500 sq. ft. Chr. Steel Ht Exchangers.
200, 268, 730 sq. ft. Steel Reboilers.
1000, 750, 500, 300, 250 sq. ft. Steel Ht Exchangers.
BJ 5 Stage Ni. Chr. Centrifugal Pump, 400 GPM, 2100 ft. hd.
20—2", 3", 4" BJ Centrifugal Pumps XPf Motors.
15—Duplex Piston Pumps from 6" x 3½" x 6" to 14" x 6¾" x 12".
IR 15" x 7" x 14" Steam Driven Duplex Air Compressors.
3—Upshot Heater Stills, chr.-moly. Tubes
4—Water Tube Boilers—511, (3)205 hp.
Ethyl Lead Plant complete with Tank, Weigh Scale, Pumps, Meters, etc.
4-Spot Truck Loading Dock, built 1952, complete with Meters, pumps, etc.

Thousands of Feet 2", 4", 6" Pipe; unused 2", 4", 6" Pipe (Schedule 40, 80, 160) Unused 3" Boiler Tubes; 3", 3½" chr. Still Tubing; Valves; Fittings; Return Bends; Hardware too numerous to mention.

Detailed Circular Upon Request.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas. Locust 1351
New York Office: 2401 Third Ave., New York 51, N. Y. Cypress 2-5703

FOR SALE EQUIPMENT

FOR SALE: Trailer Mounted Mayhew Model 2000 drilling rig with 87' Mayhew Mast complete with traveling equipment, rotary table, drawworks, engine, and substructures; but, less pump, pipe, and tools. Ideal for slim hole drilling to 6000'. Reed Drilling Company, Inc., 1408 First National Building, Tulsa, Phone 2-9638.

FOR SALE: National RB 7½ Double Drum Drawworks, with Hydramatic Brake, Chains; National Model 3426 Drawworks, with Chains. Southwestern Supply & Equipment Co., P. O. Box 14357, Houston 21, Texas.

FOR SALE: Wilson Titan Drawworks, Serial No. 6539, Foster Catheads, Hydramatic Brake, All Chains, 3-Engine Compound & Gear Box, Excellent condition, or Will Consider Trading for Truck-Mounted Franks or Cardwell Rig for Workover. Southwestern Supply & Equipment Co., P. O. Box 14357, Houston 21, Texas.

FOR SALE at Oklahoma City, 9—200 HP Bessemer Type X Gas Engine Compressor Units, equipped with 17" x 20" Bessemer or Baash-Ross overhead exhaust power cylinders and 7" or 8" x 20" high and 14" x 20" low compressor cylinders. Contact T. P. Mace, Oklahoma City Warehouse or Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: Used Model 15-A-15 Fluor Aerator Cooling Tower. To be dismantled by purchaser. Frawley Corp., 8790 Hays, Culver City, Calif.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

LARGEST SELECTION new and used cable drilling tools in the east; thousands of bargains, big savings, write us your requirements. Pipe, tubing, fishing tools, underreamers. We buy, sell, rent. Tri-State Tool, Box 827, Parkersburg, W. Va.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

FOR SALE:

2 Bethlehem Size 57-D Pumping Units, Complete with 15 HP electric motor, controls and switchbox, excellent condition.
2 National Size TU7OG Pumping Units, complete with 3 HP electric motors, controls and switchbox.
10,000' 8⅝" OD 28# Lapweld 8 V thd Casing.
3500' 7" OD 24# 8 rd thd seamless rge 2, #1 Casing.
1500' 7" OD 24# 10 V thd Lapweld rge 1 & 2 #1 casing.
1460' 6" OD 15# 10 thd smls rge 2 #1 Casing.
2000' 6⅝" OD 18.97# Lapweld PE Bev. rge. 3 line pipe.
2600' 4½" OD smls rge 2 8 rd thd #1 Casing.
10,000' 4½" OD 10.79# Lapweld T & C and PE Line Pipe.
15,000' 3½" OD EUE Tubing and Line Pipe.
20,000' 2½" smls EUE 8 rd and 10 thd Tubing.
5,000' 2⅜" OD EUE smls 8 rd & 10 thd Tubing.
10,000' 2⅜" OD Reg. Lapweld Tubing #1.
20,000' 2" Structural Pipe.
4,000' 1½" Structural Pipe.
5,000' 1" Structural Pipe.
10,000' ¾" and ⅞" Sucker Rods.
200 ton new and used Structural I-Beams, Angles, Channels and Plate.
New Longton Tank Batteries complete with stairways, walkways and connections, any size.
1—Double Drum Mobilhoist Cardwell Spudder, Model #6MZR, Serial #M-78, with telescope mast and truck mounted. Large selection of cable tools.
1—Cardwell Tubing and Rod Unit, skid mounted. Also large selection of refinery equipment and materials, send us your inquiries and offerings.

SIMON COHEN & SONS PIPE & SUPPLY CO.

P. O. Box 628 Phone 1288
AUGUSTA, KAN.

EQUIPMENT WANTED

WANTED: Rotary oil rig. Best bargain available. To drill up to 5,000 ft. Contact Pet. Inc., 311 E. 3rd., Wichita, Kansas.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

HELP WANTED

MANUFACTURERS AGENT now contacting refineries in Chicago area to handle established line of specialty valves. Write giving details and lines now handled. Manufacturer will contact prospects in Chicago middle of January. Box H-572, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER—Experienced in Design of Rock Bits. Excellent opportunity with expanding organization located in Southwest. Engineering Degree not necessary but at least two years college preferred. Work involves design and development of Rock Bits for Rotary Drilling. All replies confidential. Box H-560, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS

for aggressive manufacturing company in midwest. Graduate engineers or engineering background, in design or development work for control equipment, used in oil and gas production. Organization also needs sales engineers experienced in above lines. Company offers excellent benefits with salary review every six months. Salary range $5000 to $7000. Company pays our service charges. All information confidential. Send resumes to

Chas. J. Loveless Personnel Service,
616 S. Main, Tulsa, Oklahoma.

HELP WANTED

EXPERIENCED EMPLOYEES, for all positions on seismograph field crews, wanted by aggressive, expanding geophysical company. Please give full details of education, experience, salary expected, in first letter. Box H-566, The Oil and Gas Journal, Tulsa, Oklahoma.

PIERCEMENT SALT-DOME, subsurface geologist needed for work involving Louisiana Gulf Coast problems. Excellent opportunity for highly experienced man. HUNT OIL COMPANY, Dallas, Texas.

JUNIOR PETROLEUM ENGINEER: Oil Company in Kansas has opening for Junior Engineer in Petroleum Engineering Section. Duties will include maintaining an oil treating program. Facilities are available in the company to obtain experience in exploration, drilling and production. Applicant must have a degree in Petroleum Engineering or equivalent. Experience not a requirement. Write Box H-559, The Oil and Gas Journal, Tulsa, Oklahoma, giving personal qualifications and salary expected.

PETROLEUM ENGINEERS

Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.
Salaries commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 79
ARABIAN AMERICAN OIL CO.
505 Park Avenue, New York 22, N. Y.

WANTED

REFINERY SUPERINTENDENTS, ENGINEERS, CHEMISTS, SUPERVISORS, OPERATORS AND TECHNICIANS

FOR 2 - 3 YEARS EXTENDABLE CONTRACT EMPLOYMENT IN BAGHDAD, IRAQ GOVERNMENT OIL REFINERY

TAX FREE LIBERAL SALARY WITH FURNISHED MODERN HOUSE

We are seeking men to handle the following positions for a combination topping—vis breaking gas oil cracking—naphtha reforming unit and treating facilities and acid plant:

- OIL ACCOUNTANT
- MECHANICAL SUPERINTENDENT
- PERSONNEL AND VOCATIONAL TRAINING OFFICER
- CHIEF REFINERY ENGINEER
- WORKING REPAIR AND MAINTENANCE FOREMEN (ELECTRICAL—PUMP AND ENGINE—INSTRUMENTS—AIR CONDITIONING)
- SHIFT INSTRUMENT SERVICEMAN
- PROCESS SUPERINTENDENT
- CHIEF PROCESS ENGINEER
- PROCESS SCHEDULING ENGINEER
- PROCESS DESIGN AND EVALUATION ENGINEER
- SHIFT FOREMEN (NIGHT PLANT WIDE SUPERINTENDENTS)
- REFINERY EQUIPMENT INSPECTOR
- MACHINE AND REPAIR SHOPS GENERAL FOREMEN
- COMBINATION WELDER PIPE-FITTER BOILERMAKER FOREMAN
- STILL SHIFT OPERATORS
- CHIEF REFINERY CONTROL CHEMIST
- WAREHOUSE FOREMAN

Unless you now are or have been actually working in one of these jobs for at least two years and within last five years and can pass rigid physical examination, *please do not reply.*

Accepted applicants will be offered contracts embodying tax free liberal salary with furnished modern house including utilities, 1st class air transportation for self and family to Baghdad and return, medical care, accident insurance, and annual 30 day vacation.

Qualified applicants should send complete personal and vocational history, compensation received, and reasons for change of employment. Also please provide references and any other information you deem pertinent.

Apply by letter to General Refinery Manager, P. O. Box 1513, Chicago 90, Illinois.

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2803, Tulsa, Okla. $5.00 cash.

WANTED, One Toolpusher, must have proven background, no floaters; when you prove your ability, you will get above average salary. When you reply, advise experience and where you worked before. Box H-558, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED and Capable Specialty Salesmen to sell valves to Production and Pipeline Divisions. Box H-568, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST

"Top young man; major Co. experience in Mid-Continent area. Excellent opportunity with rapidly expanding Co. in Kansas and Colorado. Contact Personnel Director, 352 N. Broadway, Wichita, Kansas.

JUNIOR CHEMIST: Major oil research company has opening in Tulsa laboratories for a recent graduate chemist. Duties will include laboratory work of a routine nature and field process chemical studies. Experience not a requirement but preferably should have a degree in inorganic or physical chemistry. Write Box H-567, The Oil and Gas Journal, Tulsa, Oklahoma, giving personal qualifications and salary expected.

PETROLEUM ENGINEER with Masters Degree, or Doctor's in Chemical, Mechanical, or Petroleum Engineering, for research and teaching in Reservoir Mechanics and related fields at rapidly growing Southwestern institution. Rank and salary open, twelve months employment possible, consulting work encouraged and available in immediate area. Applications will be kept confidential. Box H-570, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Independent desires subsurface geologist with Oklahoma and Kansas experience for general exploration. Give detailed personal and employment history in reply. Box H-576, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

GRADUATE Petroleum Engineer, 34, married, desires position with good opportunity for advancement; 4 yrs. with major company Gulf Coast & Rocky Mts., 2 yrs. with service company. Box H-573, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES & PUBLIC Relations Executive desires position with drilling, exploration or supply firm interested in top level representation in Fort Worth and contiguous territory. Box H-571, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED all around man, tool pushing, production superintendent, completions, workovers. Family man, 43 yrs. of age, sober. Best of references. Box H-569, The Oil and Gas Journal, Tulsa, Oklahoma.

MANAGEMENT WITH aggressive independent with opportunity to participate. Eighteen years experience, management land, production, and drilling departments. Box H-537, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

COLUMNAR PADS—WORK SHEETS

DESIGNED FOR YOU!—Over 400 styles, sizes and kinds from which to choose. Sheets with 1 to 30 columns. Also horizontally-ruled sheets with no columns. Choice of Kraftbilt Green-Tint, Ivory, Canary or White Paper. Variety of sizes from 8½ x 11 to 14 x 25½ inches. Screened lines guide you without dominating entries. Ask for Catalog 654-P. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

ROYALTIES

ROYALTY, one-eightieth, section 596 and 597, Yoakum County, Texas, non-participating, for sale. Write Dr. J. A. Robinson, 233 21st Place, Santa Monica, Calif.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 817 Wright Bldg., Tulsa, Okla.

WISH TO BUY producing royalty. Send details. Box H-574, The Oil and Gas Journal, Tulsa, Oklahoma.

WISH TO BUY producing royalties. Box H-379, The Oil and Gas Journal, Tulsa, Oklahoma.

JACK EAGLE, Oil Properties, 706 City Nat'l. Bld., Oklahoma City, Oklahoma, Telephone REgent 6-7027.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

HAVE OPTION and geological reports on substantial blocks of acreage in Oklahoma, Illinois, Missouri, and Clayton County, Iowa, all in shallow areas. Will block leases, furnish geology, and make locations for percentage of acreage. For complete details write J. R. Schulte, 818 W. 13th St., Tulsa.

FOR LEASE: Solid block of twenty sections. Texas Panhandle. Ten year leases, fifty cents per acre annual delay rentals. Two dollars per acre bonus. Box H-564, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING AFTER January first, offset lease to 300 bbl. well with 25 ft. of sand. One thirty-second over-ride, $1,500. P. O. Box 26, Tulsa.

HAVE SEVERAL good drilling sites in California proven area, production close in, seeking someone to pay cost of drilling. Will complete wells at our expense share on a 50-50 basis, have excellent locations in Signal Hill, Long Beach, Huntington Beach. Box H-561, The Oil and Gas Journal, Tulsa, Oklahoma.

SEE A. L. BOWLES, Box 947, Ada, Okla. for drilling deals and producing royalties if you have the cash for Oil Investments.

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis, Mo.

WANTED

SETTLED OIL production wanted by independent operator direct from producer. P. O. Box 852, Oklahoma City, Oklahoma.

DEPLETED LEASES—Kentucky—Waltersburg, Tar Springs, Weir, Berea Sands—Complete details in reply. Box 2, Clarendon, Penna.

ESTABLISHED Manufacturer's Agent desires additional lines. Production, Drilling, Industrial. Ark.-La.-Tex. area. Box H-550, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—IDEAS

Inventions that are related or can be adapted to the oil industry. We offer capital, technical advice, patent assistance, market research, a manufacturing plant, and a sales outlet; everything to put your invention on the market. Write P. O. Box 1665, Houston 1, Texas.

TANK STRAPPER

After 20 years experience as a strapper with one of the leading pipe line companies in the midwest, I am starting an independent tank strapping company. I am equipped to strap any size tank and can furnish tables if desired.

F. E. KORB,
2011 N. Broadway, Shawnee, Okla.,
Phone 4365-W.

Will purchase producing oil properties of any size. This is direct contact with purchaser.

Send All Details To:—

MR. JACK DAVIS

DAVIS OIL COMPANY

105 W. 40th Street
New York 18, N. Y.

SERVICES

Offshore Well Locations and Surveys

Complete equipment, including Bilby Towers, Two-Way radios and Theodolites. Geodetic Methods.

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Houston, Texas—ATwood 7428

LEASE AND DRILLING BLOCKS

SAN JUAN CO., UTAH

On Cane Creek Anticline, six miles south of Moab, close to projected Pacific Northwest Pipeline, for immediate sale: now unobtainable 80 acres Federal Lease, $200.00 per acre plus 1½% override. Contact D. Amfitheatrof, 606 Hightree Road, Santa Monica, California.

LOUISIANA TAX FREE LAND

Do you know that many thousands of acres of oil land here in Louisiana under 99 year timber lease can be bought in small tracts for less than one-fourth the price of land not under timber lease?

Buy this land for oil, sulphur and now uranium and other minerals; get big lease bonuses every five to ten years for leases and retain or sell your ⅛ royalty; collect one to five dollars per acre annual rentals; lease for pasture. Pay no taxes for timber lessee pays all taxes.

Our oil belt from here to the Mississippi River (80 miles) last year produced 15,000,000 barrels. Right in this trend of production is where you want to buy land. More than 15 different sands that produce oil in this area under-lie these lands, from 1,100 to 11,000 feet. The shooting crews are here and have been here for years. The big deep play would already have started had it not been for Louisiana's Tide Land Boom.

Let me be your agent in buying you a little protection land or leases in this area.

C. E. SIMMONS, OIL INVESTMENTS
P. O. Box 270, Winnfield, Louisiana

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

PRODUCTION FOR SALE

SELL QUARTER Working Interest under 160 acres. One well flowing 45 bbl. per hr. 26 feet sand. $20,000 Cash. P. O. Box 26, Tulsa.

STRIP LOG CABINETS

MORE LOGS ARE FILED in Kraftbilt Strip Log Cabinets than all others combined. Loaded drawers glide smoothly on roller bearings. Three drawers per section, add sections as needed. Built to last a lifetime! Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

BUSINESS OPPORTUNITY

RECENTLY ORGANIZED Eastern group with venture money for drilling of wildcats, development, farmouts. You are dealing directly with principals. Box H-538, The Oil and Gas Journal, Tulsa, Oklahoma.

RECENTLY ORGANIZED group seeking proven oil property with an income of $10,000 to $40,000 per month. You are writing directly to the principals. Prompt action. Box H-536, The Oil and Gas Journal, Tulsa, Oklahoma.

PRINCIPAL WILL PURCHASE: Oil Property from Independent, or—Producing Oil Co. (stock or property),—Oil Royalty Co., either stock or property where Purchase Price Valuation is $200,000.00 and up.

Box H-547, The Oil and Gas Journal, Tulsa, Oklahoma.

CUBA, THE NEW OIL COUNTRY:

Activities are rapidly expanding. Many Independents are already drilling. We control large areas throughout the entire Island. We also have large blocks in the actual producing fields (Bacuranao, Motembo, Jarahueca and Jatibonico) the latest discovery made by Kerr-McGee Oil Industries. This Company will drill 3 wells in the Jarahueca Field. We will sell 1/64th of each well for $1,000.00. We wish to contact party with a complete small rotary, preferably Cardwell model H, truck mounted, willing to sell or receive an interest for the use of the equipment.

CUBAN OIL ENTERPRISES.
Aguiar 574 Bl. Havana, Cuba.

OFFICE SPACE

Air-Conditioned

OFFICE SPACE IN

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For your Texas Headquarters

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PLYMOUTH BUILDING

Space available about March 15

PLYMOUTH LIFE INSURANCE COMPANY

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AUSTIN, TEXAS

MINING PROPERTIES

URANIUM CLAIMS adjoining one-half million dollar core drilling program already in progress in Utah. Several producing mines near-by in Shinarump. Ore no deeper than 50 feet and can be strip mined in places. For sale by Owner with reasonable royalty reserved. Box H-575, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

Equipment Men

Tod Pazdral to Represent Holcombe in Pipeline Sales

Tod Pazdral Pipeline Specialties has been appointed representative for Holcombe Co., Inc., according to Tom Holcombe, president. Holcombe is distributor for Lion Pipeline Enamels, felt and glass wrap, and manufacturer and distributor of Holcombe cathodic-protection equipment.

The Tod Pazdral firm is also representative for T. D. Williamson, Inc., in the Gulf Coast states from Texas to Florida, except West Texas.

Tod Pazdral, president of the company, with 27 years' experience in the pipeline industry, offers complete service in consulting, internal cleaning, inspecting, and testing. Assisting him are James H. McBrien, corrosion engineer formerly with T. D. Williamson, and Jack Pelkey, Pazdral representative in Florida, Georgia, Alabama, and Mississippi.

Emsco Manufacturing Co. Promotes Two at Garland

The appointments of J. E. Oster as plant manager, D. & S. division, Emsco Manufacturing Co., Garland, Tex., and J. W. Mackey to succeed Oster as office manager at Garland, have been announced by W. T. Powell, president, Emsco Manufacturing Co.

Oster has been office manager of D. & B. Division since 1946. He succeeds J. G. Hast, who passed away in October. Prior to his employment with Emsco, Oster was with Standard Brands, Inc., Dallas office for 10 years.

Mackey came to work for Emsco in 1939 at Los Angeles and was transferred to the Garland plant in 1951, as manager of the price department and export sales.

Houlihan Named Vice President, Rawson & Co.

R. E. HOULIHAN

The appointment of Robert E. Houlihan as vice president of Rawson & Co., Houston, manufacturers representatives, has been announced by W. Brant Rawson, president.

For the past 8½ years Houlihan has been associated with Maintenance Engineering Corp. as sales engineer in the mechanical department handling the application and sales of mechanical equipment to the oil and chemical industry, power plants, paper mills, and engineering contractors.

Canadian Meter Names A. J. Campbell as Sales Engineer

A. J. CAMPBELL

Appointment of Allan J. Campbell as sales engineer in the eastern division has been announced recently by John W. Ostler, manager of Canadian Meter Co. Campbell came to Canadian Meter from Crane Ltd., and recently completed a training course at American Meter Co., Inc. in Erie, Pa.

This announcement came shortly after a news release concerning the company's move from Hamilton to Milton, Ont. Canadian Meter, which has operated in Hamilton for a half century, is building a new plant on a 15-acre site in Milton. It is planned to have the new plant in production early next spring.

Hiter to Head Flexonics Expansion-Joint Sales

The appointment of E. L. Hiter as sales manager of Flexonics expansion-joint division has been announced by T. K. Wells, general sales manager of Flexonics Corp., Maywood, Ill.

Since 1952 Hiter has been serving as western manager with headquarters in San Francisco and Los Angeles. Prior to his western appointment, he held several sales administrative positions in the central and field offices of Flexonics.

Philadelphia Pump Becomes American Meter Subsidiary

American Meter Co., has announced that Philadelphia Pump & Machinery Co., Inc., manufacturers of chemical proportioning pumps and controlling equipment, has become a subsidiary of American Meter Co.

President of the subsidiary will remain Joseph A. Eagan. The vice president is Wm. G. Hamilton, Jr., and Wm. Ashby is secretary and treasurer.

Philadelphia Pump & Machinery Co. which has recently exhibited new lines of chemical proportioning pumps and controlling equipment, will have its headquarters at American Meter's Philadelphia office.

Zublin Joins Petroleum Engineering Associates

C. W. ZUBLIN

The appointment of C. Wm. Zublin as sales manager of Petroleum Engineering Associates, Inc., Pasadena, Calif., has been announced by Florent H. Bailly, president.

Zublin has been actively engaged in the petroleum-drilling field for the past 5 years. He was formerly assistant engineer and field supervisor of Universal Engineering Co., Los Angeles, where he specialized in drainhole equipment.

Los Angeles Metal Men Form Quarter Century Club

Selecting the Quarter Century Metals Club as their organizational name, a group of pioneer Los Angeles and Orange County metal-working executives have formed a new club.

Membership in the club is limited specifically to men who have served in an executive capacity for at least 25 years with Los Angeles and Orange County firms engaged in the manufacturing or processing of metals.

Directors of the club include: Delbert Axelson, Axelson Manufacturing Co.; William Batchelor, general manager, General Electric Co.; W. A. DeRidder, General Metals Corp.; W. W. Farrar, vice president, Farbest Corp.; Robert Gregg, foundry manager, Reliance Regulator Division, American Meter Co.; Jim Griffin, president, James H. Griffin Co.; Earle V. Grover, president, Apex Steel Corp., Ltd.; Ott Hammer, president, Security Engineering Division, Dresser Operations, Inc.; Earle M. Jorgensen, president, Earle M. Jorgensen Co.; Lloyd D. Kay, president, Kay-Brunner Steel Products, Inc.; J. C. Meyer, general partner, Snyder Foundry Supply Co.; K. T. Norris, president, Norris-Thermador Corp.; Morris B. Pendleton, president, Plomb Tool Co.; John B. Rauen, chairman of the board, United States Spring & Bumper Co.; Alden G. Roach, president, Columbia-Geneva Steel Division, U. S. Steel Corp.; Lionel J. Soracco, manager of sales, Bethlehem Pacific Coast Steel Corp.; J. D. Spalding, works manager, National Supply Co.; R. A. Stumm, president, Southern Pipe & Casing Co.; Reese H. Taylor, president, Union Oil Co. of California; and C. B. Tibbetts, president, L. A. Steel Casting Co.

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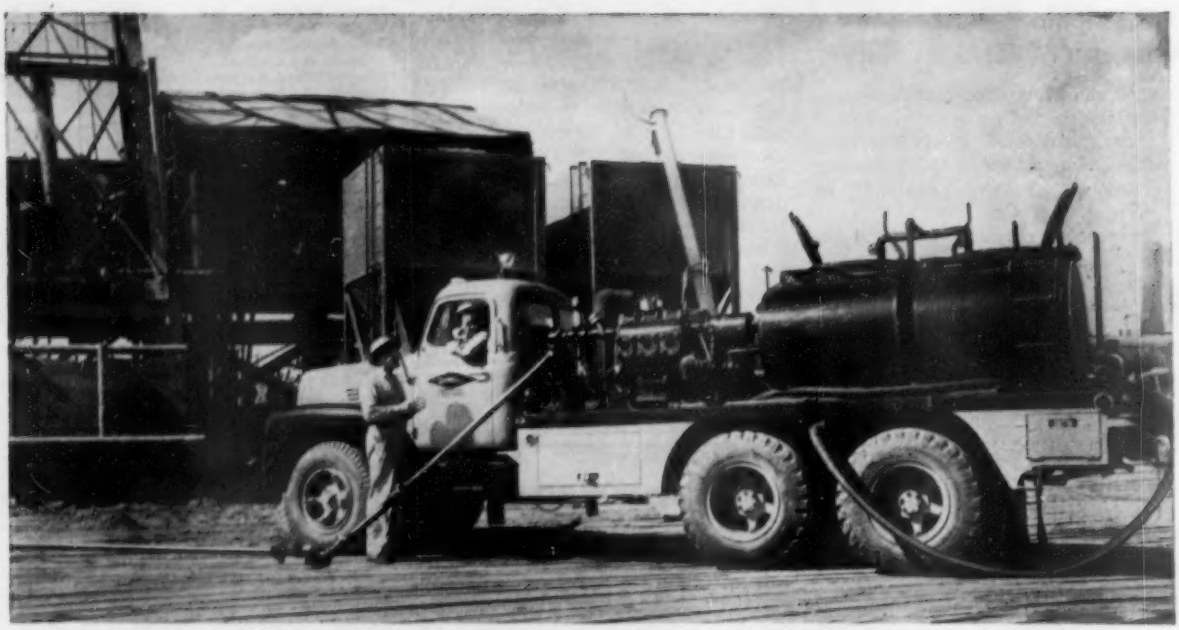
LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that three parcels of land containing 480 acres of land within the known geologic structure of the Bell Rock Field, Moffat County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P.M., E.S.T., February 16, 1955, when bids will be opened. Details of the lease offering, description of the land, how and where to submit bids, and bid forms may be obtained from the Manager of the Land Office, Denver, Colorado, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 11.62 acres of land in the NE¼ sec. 35, T. 58 N., R. 98 W., 6th P.M., within the known geologic structure of Frannie field, Wyoming, will be reoffered in one parcel for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1:00 p.m., E.S.T., February 23, 1955, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids, and bid forms, may be obtained from the Manager of the Land Office, Cheyenne, Wyoming, or from the Director, Bureau of Land Management, Washington 25, D. C. L. E. Hoffman, Minerals Officer.



Dowell engineers use the latest treating techniques, specially designed tools and high-pressure, high-volume pumping equipment.

MUD CAKE REMOVED

Dowell Mud Acid treatment increased well potential 126 bbls. oil per day

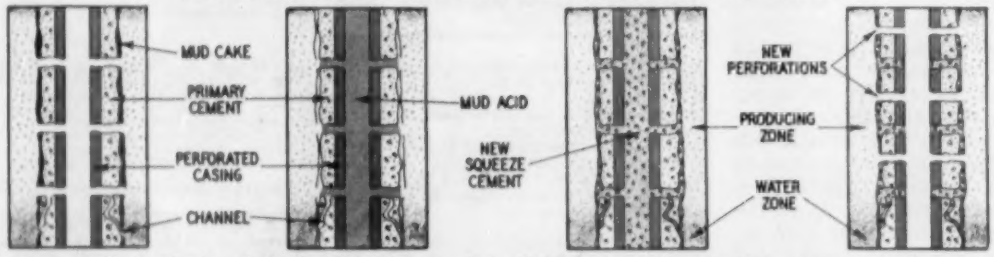
A well had shown good oil saturation, but failed to produce when completed. The operator believed that mud and mud cake on the screen, perforations and the face of the pay was restricting oil flow. Dowell engineers, called on the job, recommended Mud Acid. Following the treatment, the well's potential was 126 BOPD, flowing.

Mud Acid is a special acid solution designed to dissolve clay minerals and destroy the swelling and colloidal properties of bentonitic materials — such as found in drilling mud. It is used to restore and increase permeability of critical zone at well bore, to clean liners, screens, perforations and the formation face.

Mud Acid is also used to free stuck drill pipe; to spearhead fracture treatments; to clean gravel packs; to increase capacities; and to reduce injection pressures of gas and water input wells.

Call the nearest station today for full details on Mud Acid and the many other Dowell oil field services. Or write to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. A-11.

HOW MUD ACID ALSO HELPS IN SQUEEZE CEMENTING



1. Incomplete removal of mud cake produced a poor cement job. This mud may break down, permitting water or gas to enter well.

2. Dowell Mud Acid (used ahead of squeeze job) removed mud cake, cleaned old cement surfaces, exposed clean formation.

3. Following Mud Acid wash, squeezed cement penetrated open spaces . . . formed a good bond with the formation and casing.

4. Here is the well after excess cement had been drilled out and casing re-perforated. In this way, producing zone was isolated.

DOWELL SERVICE

chemical services for the oil industry

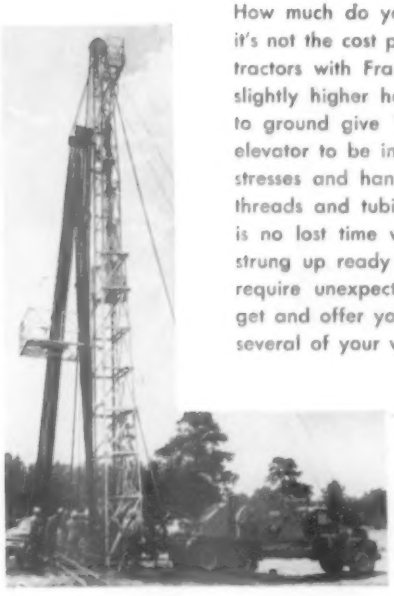
DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

There must be some mistake in your time tickets - the job costs are lower but the cost per hour is higher.
No mistake! - we changed to contractor using Frank's Units which do the job so much faster that altho the Charges are more per hour it costs us less per job
AUDITOR

Why Franks Oil Well Servicing Units Save Oil Companies Money When The Cost Per Hour Is Higher

How much do your individual rod, tubing and workovers cost per job done? On your invoice it's not the cost per hour you pay for, but the number of hours it takes that runs up the bill. Contractors with Franks equipment will do your work in most cases in enough fewer hours to make a slightly higher hourly price to you less than you have been paying per job. How? No guy lines to ground give 15 minutes on location rig-up; with air rod transfer to rod fingers allowing rod elevator to be in constant motion up and down. By hanging rods, which is fast, the bending stresses and handling losses are eliminated. Stacking tubing also gives faster work and protects threads and tubing. Hydraulic operated tubing tongs are fast and easy on the threads. There is no lost time waiting to change lines or waiting on another swab unit since the sandline is strung up ready for instant use. Full rotary equipment is ready for instant use should your well require unexpected work. Strength, stability and safety of Franks rigs enables contractors to get and offer you crews that are the best in the country. Let a contractor with Franks units do several of your various well jobs to confirm this economy.



This is the Franks Rocket telescoping derrick, truck mounted servicing unit which allows companies to pay contractors more per hour, but less per job. Both company and contractors make more money when Franks units are used.

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TULSA, OKLAHOMA
"on the SPOT" field SERVICE

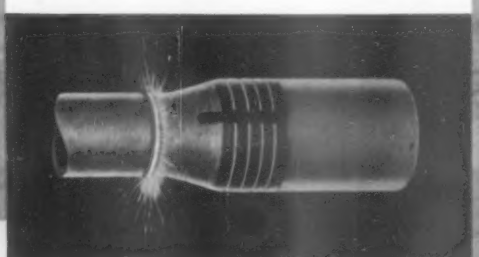
On the spot field service with stock of parts, 24-hour service and factory trained mechanics at: Alice, Compton, Casper, Farmington, Great Bend, Houston, Kilgore, Odessa, Seminole, Edmonton, and Tulsa.

More trouble-free rotating hours!

You get more trouble-free service at a *lower cost per-foot-of-hole* with HUGHES "Flash-Weld" tool joints... made to last the life of your drill stem.

HUGHES hardfaced tool joints withstand the wear of abrasive formations, and, to meet extremely abrasive conditions, may be *safely* rehardfaced in the field.

Pioneered and developed by HUGHES, "Flash-Weld" tool joints have been proved in thousands of wells, in hundreds of fields, and on more than 32,000,000 feet of drill pipe.



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